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GREATER GERMANY

Economic Estimate

March 15, 1942.

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Table of Contents

GERMAN ECONOMIC ESTIMATE

Page

General Economic Characteristics 1
Natural Resources 1
Degree of Economic Development . . . . . 1 - 5
Effect of German-Russian War on German Economy 5
Trans-Siberian Imports 6
National Productive Capacity 7
Agriculture 7
Central Europe 7
Food Situation, 1939-1941 7
Pre-war Degrees of Self-sufficiency . . . . . 7 - 8
Wartime Supplies . . . . . 8 - 9
Prospective Supplies, 1941-1942 9
Outlook for 1941-1942 food situation . . . . . 9 - 10
Germany: Statistical Tabulations. . . . . 10 - 11
Table 1 12
Table 2 13
Table 3 14
Table 4 15
Table 5 16
Increase in Vegetable Acreage 17
Mechanization of Agriculture 17
Table I . . . . . 17 - 18
Table II 19
Mining and Metallurgy 19
Aluminum - (Bauxite) 19
Antimony . . . . . 20 - 21
Beryllium 21
Cadmium 21
Chromium 21
Cobalt . . . . . 21 - 22
Copper . . . . . 22 - 23
Gallium 23
Graphite 23
Lead 23
Magnesium 23
Manganese 23
Mercury 24
Molybdenum 24
Nickel 24
Radium 24
Salt 24
Tin 24
Tungsten (Wolfram) 24
Uranium 25
Vanadium 25

CLASSIFICATION
Changed to
UNCLASSIFIED

Zinc 25
Summary 25
Petroleum 26
Oil Production 26
Estimated Domestic Oil Supplies - Crude and Products Last Half of 1941 27
Possible Maximum and Minimum Oil Supplies Available. . 28
Estimated Supplies, First six months, 1942 28
Estimated Annual Output of German Synthetic Plants . . 29
Oil Consumption 30
Transportation of Oil . . . . . 30 - 31
Conclusions . . . . . 31 - 32
Coal and Coke 32
Manufacturing 33
Hermann Goering Works 33
Steel . . . . . 33 - 34
The Motor Industry 34
Rationalization . . . . . 34 - 35
Production . . . . . 35 - 36
Exports and Imports 36
Registrations of Buses, Trucks, and Diesel Units of Continental Europe as of December 31, 1939 37
Machine Production . . . . . 37 - 39
Electrical Industry 39
Electric Power: Capacity, Production, Consumption . . . . 39 - 42
Chemicals and Allied Industries . . . . . 42 - 43
Nitrogen 43
Glycerine 43
Gas 43
Copper Sulphate . . . . . 43 - 44
Sulfuric acid 44
Sulfur 44
Phosphate Fertilizers 44
Potash . . . . . 44 - 45
Soap 45
Quinine 45
Oils . . . . . 45 - 46
Paint and Varnish 46
Plastics 46
Glass 46
Arsenic 46
Borax 46
Dyes 47
Casein 47
Explosives 47
Alcohol 47
Rubber and Buna . . . . . 47 - 50
Calcium Carbide 50

CLASSIFICATION
Changed to
UNCLASSIFIED

Carbon Black 50
Textiles . . . . . 50 - 51
Textile Fibers . . . . . 51 - 52
Collection of Textile Waste . . . . . 52 - 54
Hides . . . . . 54 - 55
Timber . . . . . 55 - 56
Improved Timber Situation . . . . . 56 - 57
Substitute Materials . . . . . 57 - 58
Rubber . . . . . 58 - 59
Leather 59
Paints, Varnishes, Lacquers, etc. 59
Metals and Metal Conservation 59
Other Synthetic or Substitute Products . . . . . 59 - 60
Substitutes for gas and Diesel Oil 60
Compressed Gas 60
Propane and butane 60
Methane 60
Coal gas 60
Producer Gas . . . . . 60 - 61
Shipping 61
Summary . . . . . 61 - 63
Table I - Tabulated Summary of all Shipping Available to Axis 64
Table II - Axis Tanker Shipping Strength 65
Commerce 66
Foreign Trade 66
Volume of Foreign Trade . . . . . 66 - 67
Germany's Wartime Trading Partners . . . . . 67 - 68
Different Types of Trade Agreements . . . . . 68 - 70
Expansion of the Reich's Customs Territory . . . . . 70 - 71
Extension of Multilateral Clearings 71
Shifts in Foreign Trade 71- 72
Domestic Trade . . . . . 72 - 73
Transportation 73
Inland Waterways . . . . . 73 - 74
Communications 75
Cables 75
Government System 75
Private System 75
Radio and Television . . . . . 75 - 76
Telephone and Telegraph 76
Finance 77
National Income and Expenditures 78
Taxation 78
Summary 78
Banking and Currency . . . . . 78 - 79
Population . . . . . 79 - 81
Vital Statistics . . . . . 81 - 82

CLASSIFICATION
Changed to
UNCLASSIFIED

Social Structure . . . . . 83 - 84
Social Conditions . . . . . 84 - 85
The Cost of Living . . . . . 85 - 86
Labor . . . . . 87 - 88
Foreign Civilian Labor 88
Table I - Estimates of Foreign Civilian Labor . . 89 - 90
Table II - Occupational Distribution of Foreign Labor 91
Table III - Distribution of Foreign Labor by Nationalities 92
Foreign Labor Continued . . . . . 93 - 95
Summary and General Conclusions . . . . . 95 - 99

List of Appendixes 100
Appendix A 101
Appendix B 102
Appendix C 103
Appendix D 104
Appendix E 105

Economic Who's Who . . . . . 106 - 110

March 15, 1942.
(Revised as of above date.
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GREATER GERMANY

Economic Estimate

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1. General Economic Characteristics.

a. Natural Resources. The territory of Germany has expanded so rapidly since the invasion of Poland in September, 1939, that it is difficult, if not impossible, to define the immense resources over which Germany now has control. The occupation of Austria in 1938, of Czechoslovakia in 1938 and 1939, and the conquest of Poland in 1939, were followed in 1940 by the successive subjugations of Denmark, Norway, Luxembourg, Netherlands, Belgium, and part of France. In addition, Hungary and Rumania were joined to the Axis. Early in 1941 Bulgaria, Yugoslavia, Greece and Crete came under German control and the invasion of Russia began. Since the beginning of the Russian Campaign, (June 1941) German forces have occupied Esthonia, Latvia, Lithuania, East Poland, White Russia, Bessarabia, the Ukraine, and large areas of Great Russia.

It has been estimated that Germany is now in control of over a million square miles of European territory outside the German frontiers - an area four and one-half times the size of Germany.

Spain, Italy, Portugal, Sweden, Switzerland, and Finland are the only countries in Continental Europe which are not under direct domination of Germany, but their sovereignty may be considered only nominal. Turkey, likewise, has been drawn into Germany's orbit through economic warfare.

Until Germany has consolidated her victories, and until her domination over occupied countries has been clearly defined, it is impossible to estimate her complete natural resources, productive capacity, and general economic status.

Nevertheless, certain figures and comparisons may throw light on the extent of the Reich's expansion. Up to June 1941 (invasion of Russia) Germany had added over 750,000 square miles of territory and some 150,000,000 population, (from Austria, 1938, through Greece and Crete, 1941). By December 1941 Germany's penetration into Russia yielded a further 650,000 square miles and domination over an additional 82,000,000 population.*

b. Degree of Economic Development. The present war, which started with a cry for "living space" (Lebensraum) and self-sufficiency has led, with the acquisition and occupation of most of continental Europe, to the necessity for planning a new "large scale" economy (Grossraumwirtschaft). The culmination of the Drang nach Osten in the attack on Russia, and the subsequent occupation of Russian territory, has placed the economy of Germany, and of Europe generally, in a period of transition from one of national or local hegemony to a consolidated Grossraumwirtschaft on a gigantic scale.

The "Germanization" of conquered territories has made some progress. The "Government General" of Poland has increasingly taken on the character of a portion of the German Reich. Under this program the non-German elements would be deported.

*- See Appendix C for growth from 1933 to May 1940.

Only estimates can be made regarding the total amount of production of the vanquished and controlled countries which must be placed at the disposal of Germany.

Germany's economic position was greatly strengthened by the conquest of Poland in 1939. Of inestimable value were the large agricultural areas, which even in 1937 produced exportable surpluses in barley, rye, oats, wheat, sugar beets and potatoes among others. Under the German plan for intensive cultivation, the production of these has probably increased greatly.

Poland has always had sufficiencies of animals and in the last two years the breeding of cattle and hogs has been greatly intensified. To make use of the great pasture areas in Poland, Germany has transferred there many animals from the occupied territories, notably Denmark.

The raw material position of Germany with regard to flax, hemp, and certain furs (largely cat and rabbit) was also greatly improved by the Polish conquest.

Of great importance to Germany is the output of crude oil in Poland, estimated at about 500,000 tons, and the refining capacity of about 1,000,000 tons. Such products as gasoline, ozocerite, kerosene, lubricating oils, and paraffin are of vital importance to Germany.

In addition to the important sufficiencies in coal, coke, petroleum, zinc, lead, potash, and salt, it should be mentioned that there are quantities of phosphates which can be exploited. The phosphates are of particular importance since Germany is not yet self-sufficient in that field.

It is certain that Germany has obtained many raw materials which she has been lacking, notably: iron ore and magnesite from Austria and Bohemia; zinc, lead, and flax from Poland; molybdenum (and some aluminum, copper, nickel, and chrome) from Norway; iron ore from Luxembourg; coal and iron ore from France; zinc and lead from Bulgaria; bauxite, lead, and copper from Yugoslavia; nickel and chromium from Greece and Crete; and, most important of all, oil from Rumania.

Just how much Germany acquired in booty is impossible to determine. We do know, however, that she seized small reserves of mercury, antimony, and copper from Austria, and in her march against France gained access to stores of copper, brass, lead, zinc, manganese, and tin. There is no accurate information on the booty seized in the Russian campaign. Nevertheless, Germany has extended her control of territory in Russia which produces manganese, mercury, bauxite, iron, oil-shale, and coal. The extent of damage left in the wake of Russia's "scorched earth" policy has not been determined, but it is reasonable to believe that in one or two years, the production capacity of these areas will approach normal output. Likewise, Germany will ultimately have access to the enormous grain fields of Russia and to that country's flax and wool.

Reports reaching us from Russian and German sources are full of contradictions. Nevertheless, on the basis of these reports and our previous knowledge of the geographic and economic aspects of the conquered territory, a general and fairly accurate picture can be formed. The numbers and percentages are, of course, subject to constant revision as more accurate data reach us.

By the first of December 1941, it appears that Germany had gained control of: (1) 1,800,000 square km*, including Karelia and Kola, which

* kilometers

equals 40% of Russia's European territory (including the annexed districts, Bessarabia, the Baltic States, and Poland), or about 8% of all Russian territory; (2) 82,000,000 population, including the annexations, which is equivalent to 42.5% of the total population before the war, (or 59,000,000 population in Russia proper = 35% of entire population of U.S.S.R.); (3) about 40% of Russia's industry. The Ukraine contained 18% of all Russia's industry, the Leningrad area 14%, White Russia 2%, and other occupied areas 5%.

(4) Mining:

	Percentage of Russia's total Production (Based on 1939 figures).
Coal and coke	75% (60% came from the Ukraine).
Aluminum	60%
Iron ore	60%
Rolled steel	37.5%
Steel products	52%
Pig iron	66%
Manganese	35% (of which Georgia produced 60%).

(5) Agriculture. 30,000,000 hectares under cultivation = 34% of total area under cultivation, including Bessarabia, Baltic States, and Poland. (16,000,000 hectares of this produced bread cereals. A total of 62,000,000 hectares were sown altogether).

	Percentage of Russia's total
Potato area	50%
Sugar beet	83%
Cabbage	42%
Other areas	62%

To exploit the vast Russian hinterland in the interests of German and European economy, Dr. Alfred Rosenberg was appointed, in November 1941, to the post of Reich Minister for Occupied Russian Territory.

One of the major problems confronting Germany was the restoration and utilization of Russia's railroads. The wider gauge of the Russian tracks was converted to the standard European gauge by replacing one rail. It was reported that by the end of October 1941, standard gauge lines extended at least as far, if not beyond, Luga, Dno, Smolensk, and Kiev, and that all lines in Poland and Rumania, with the possible exception of some sections in southern Bessarabia, have now been converted to standard gauge. According to official German figures, over 15,000 km* had already been changed by November 1941.

In order to exploit the factories, resources, and facilities made available by conquest in Russia, and to cope with the gigantic problem of restoration and salvage, a new economic organization was set up to reinforce the engineering group under Dr. Todt. This new semi-military organization, which was used only rudimentarily in the Western Campaigns, consists of a specially trained engineer and technician corps, and is charged with the restoration of the industrial and public utility establishments.

Major General Thomas heads the special economic division located in Berlin, and he works directly under Field Marshal Keitel. In the theater

*kilometers

of war there is a branch of this economic organization with each echelon of higher commands.

There follows in the report an outline of the organization with the Northern Group of Armies under the command of Field Marshal Ritter von Leeb.

(1) Northern Army Group:

Defense Industry Staff Görlitz (believed to be name of man leading the organization).

(a) This staff is divided into four different departments as follows:

1. Defense Industry and Equipment Office.
2. Liaison Officer with the High Command of the Army.
3. Army Group G-4 (General Quartiermeister).
4. Liaison Officer with local Army commands.

(b) The missions of the Defense Industry Staff are three-fold:

1. Supply the combat troops and provide for the supply of the local population.
2. Inspect captured industrial activities and submit estimates on their capacity and ability to produce essential war materials.
3. Locate and secure all stocks and stores.

(c) This organization has three general agencies which are utilized to carry out the missions above:

1. Technical Organizations (Technische Kommandos). These units are about a battalion in size and they specialize in public utilities (electricity, gas, and water) and the rehabilitation of military technical equipment.
2. Economic Troops (Wirtschafttruppen). Raw materials, machines, food supplies.
3. Petroleum Troops (Mineralöltruppen). Petroleum and petroleum supplies.

A decree dated October 18, 1940, extended the Four Year Plan for another four years. The aims of this second Four Year Plan have been defined as follows:

> "With the Second Four Year Plan, we are continuing in all fields the gigantic work of reconstruction under the same principles and by the same means as heretofore. In the war, the Plan represents a rigid system of order and efficiency to which the entire economic and social life of the Greater German Reich must be subjected. Along with supplying the defense services with arms, equipment, and munitions, the raw material program will be carried further under the Second Four Year Plan. Construction projects for the production of iron and steel, light metals, synthetic motor-fuel, Buna (synthetic rubber), and other substitute materials will be completed and work started on new undertakings. As a consequence, only a comparatively limited capacity will be available for the manufacture of consumer goods."

A noteworthy development in the centralization of economic control has been the appointment of Dr. Todt to the newly created office of "Inspector General for Water and Power." The functions carried out by Todt have hitherto been exercised by three separate ministries, i.e., the

Economics Ministry, Agricultural Ministry, and Transportation Ministry. Some powers have been left to these ministries, but all administrative functions relative to the planning of power resources and to construction of all kinds is now centralized by the power represented in the offices held by Dr. Todt.*

c. Effect of German-Russian War on German Economy. One of the most important and immediate implications of the German-Russian war, at least from a short-range viewpoint, is that it deprives Germany for the time being of that constant flow of food and raw materials from the Soviet Union, which, according to reiterated statements of the Reich's leaders and utterances of the German press, were of decisive importance in "breaking" the Allied blockade of Germany and of continental Europe. The quantitative role of these supplies in German war economy may be gauged by the fact that speaking on June 14, 1941 in Vienna, Herr Walther Funk, Minister of Economics, stated that the value of Germany's trade with the Soviet Union had increased tenfold since the last peace year. In fact, in the course of this development Russia had during the past two years become one of the four principal trading partners of blockaded Germany along with Italy, Rumania, and Sweden.

The qualitative role of Russian supplies was of equally great importance to Germany's war economy considering that they consisted of such products as barley, petroleum, cotton, manganese ore, asbestos, apatite, et cetera. Although the exact quantities of these essential materials which have crossed the German-Soviet border since September 1939 have been kept strictly secret, it has been claimed in the German press that the deliveries of barley approximated one million tons per annum and that the shipments of petroleum products were also close to one million tons. The importance of Russian supplies of fodder grain for the maintenance of the German hog population during the first year of the war at a level which was claimed to be only slightly below that of peace time has often been emphasized in the German agricultural press. In 1941 these Russian supplies of fodder grain, which under the new trade agreement concluded with the Soviet Government on January 10, 1941, were to be supplemented by unspecified deliveries of wheat and rye appeared to be all the more important because of the admittedly unfavorable outlook for grain supplies from the Balkan countries during the coming crop year.

According to opinions which seem to be prevailing in German circles, the Reich will be able to obtain from Russian territories occupied, organized, and exploited by Germany larger quantities of the respective materials than it had been able to obtain as voluntary deliveries on the part of the Soviet Government. But quite independently of the question whether this prognosis predicated upon a complete and early victory in the new eastern campaign will prove correct from a long-range viewpoint, several factors, including the deliberate destruction of stocks and equipment by a retreating enemy, the congestion of transport by military operations, et cetera might postpone the realization of these plans. It should also be noted that the production areas for some of the most important commodities which Germany had been obtaining from Russia during the first two years of the war, especially oil and cotton, lie in part thousands of miles behind the front line as established after the first month of hostilities.

* Dr. Todt died February 8, 1942. Successor, Albert Speer.

Finally, one of the most important repercussions of the establishment of an eastern front from the White to the Black Sea is the cessation of all transit trade to Germany from middle eastern and far eastern countries. This implies the stoppage of imports of soybeans from Manchuria; of cotton, hides, rice, and other products from Iran and Afghanistan; quite apart from the quantities of rubber, tin, tungsten, and other war-essential products that might have penetrated into Germany via Siberia during the first two years of the war. Thus, with Germany's invasion of Russia, the ring of the Allied blockade of Germany and of German-dominated Europe became complete.

(1) Trans-Siberian Imports. An official report states that during the first five months of 1941 222,000 tons of essential commodities were shipped to Germany from Japan, Manchoukuo, and China via the trans-Siberian railway. The total imports into Germany from Japan by the same route during the whole of 1940 were 166,000 tons.

According to a compilation by the Chief Customs Bureau, there were heavy imports of Soya and Japanese beans, whale oil, and other products.

A partial list of the important imports is given in the following table:

(Metric tons)

No.	Classification of Goods.	Transit for year 1940.	Transit for five months of 1941.
1.	Soya and Japanese beans.....	58477	109402
2.	Whale Oil.....	44957	33157
3.	Fish (? Cod) Oil.....	11756	13005
4.	Semi-manufactured rubber.....	338	218
5.	Rubber wares.....	1013	1816
6.	Rubber.....	3199	12236
7.	Fats.....	2086	2895
8.	Vegetable Oils.....	9038	12182
9.	Nuts.....	9313	5325
10.	Tea.....	3291	4780
11.	Tinned food.....	4951	3845
12.	Copper and copper wares.....	1969	2835
13.	Oilseeds.....	498	1930
14.	Copra.....	-	1921
15.	Casings.....	140	531

2. National Productive Capacity.

a. Agriculture. Germany still maintains a position vastly superior to that of most European countries, though prospects seem less favorable than a year ago. It has been pointed out in previous statements that Germany's food position in this war has appeared to be considerably better than in the comparable World War period and that there was no prospect of an early collapse or even slowing down of that country's war machine on account of the food situation.

(1) Central Europe: Germany, Austria, Czechoslovakia, Poland.

(a) Food Situation, 1939-1941. Germany's food situation in the first two years of war has been relatively favorable, although the reduction in civilian consumption of individual foods compared to pre-war is substantial. The rationing system clearly favors large-size families and, above all, those consumer groups which most directly sustain the military, industrial, and agricultural war effort. The total calory value of food consumption by the civilian population during the first two years of this war may be estimated to have been around 90% of the pre-war level. For important consumer groups it may not differ much from their pre-war standard; for the common city dweller in non-manual work - the normal consumer - the restriction is very considerable. The supply of carbohydrates has been fairly ample. As a result of the imposed shifts in the diet, however, the proportions of fats and proteins, and of food vitamins and mineral salts, are generally reduced. In connection with this reduction in supplies it is well to remember that the many strains of war increase rather than reduce the physiological requirements of the human body.

Relative food consumption in Austria and the Sudetenland, compared with that of pre-war years, appears to be much the same as in the Old Reich. Relative allowances of some foods in Bohemia-Moravia are smaller, and the food situation there, in the urban centers at least, is considerably less satisfactory than in Germany proper. An extremely unfavorable situation is generally known to exist in Poland, where the Polish and Jewish populations are subjected to grave privations. The agricultural surpluses of Western Poland, which as a rule were partly used to cover deficits in Central Poland, are now being diverted to Germany.

(b) Pre-war Degrees of Self-sufficiency. Germany's food economy at the outbreak of war had a high degree of self-sufficiency. Probably somewhat more than 80% of total food consumption in recent pre-war years, calculated on a calory basis, was covered by domestic production. Austria was deficient in bread, grains, fats, and meats; Czechoslovakia, mainly in fats. Western Poland was and is an important agricultural surplus region. On the other hand, the "Government General of Poland" (Central Poland) normally has a food deficit.

In recent pre-war years Germany produced more bread grains than required for human consumption, leaving a surplus for feeding to livestock

or for accumulation of reserves. Production of potatoes and sugar* amply covered human requirements, and large quantities of potatoes were available for feeding. Feeding of imported grains in recent pre-war years amounted to little more than 8% of the total quantity of grains and potatoes (in terms of grain) which was fed to livestock, notably hogs. On the other hand, Germany depended to a considerable extent on imports from overseas for feed concentrates. Yet it should be remembered that, while these concentrates were very important in certain sectors of the dairy industry, Germany's cattle herds subsisted mainly on pastures, meadows, fodder crops, and other domestically produced feeds.

In regard to meats, Germany was almost self-sufficient. Although part of these meat supplies were produced with imported feeds, such dependence on imported feed was not very large, as is indicated by the feed balance. There was, however, a substantial deficit in fats, which is today the chief weakness in the German food situation. Domestic Production before the war amounted to little more than one-half of relatively high normal requirements.

(c) Wartime Supplies Agricultural production during the first two years of war, on the whole, has apparently been maintained at a high level, and imports as well as requisitions of foodstuffs from the occupied or otherwise dominated countries have added considerably to the domestic output of fats and oils, meat, vegetables, and fruits. Supplies of bread grains, potatoes, and sugar have been ample, and a considerable improvement in vegetables has taken place in the second war season. Fruit supplies, despite sizable imports, were short because of unfavorable domestic crops. An important favorable factor in Germany's wartime food situation was the accumulation, since the middle of 1937, of substantial reserves of grains, as well as fats and oils (or raw materials). Certain reserves of meats and eggs are also known to have been laid in before the outbreak of war. In August 1941, at the beginning of the third war season, total carry-over stocks of bread grains may still have amounted to about 5½ million short tons; government stocks of fats and oils to almost 200,000 short tons, and of meats to about 300,000 short tons. Paradoxically, stocks of preserved meat were very probably increased in the second half of 1940; so they were actually higher at the end of the season 1940-1941 than a year previous. Yet civilian meat rations were reduced from June 2, 1941. It is not unlikely that this reduction should be interpreted as a

*-A British study of sugar supplies in Europe, dated December 1, 1941, also came to the conclusion that sugar beet production is ample to ensure a reasonable level of sugar consumption. Surplus producing countries, such as the Protectorate, can meet the demands of deficient countries, such as Finland, Norway, and Greece. If unduly large quantities should be consumed as fodder or for the production of alcohol, to be used as motor fuel, for example, the picture might be changed.

Annual supplies (production plus small imports) from 1935 to 1938, for German Europe (i.e., those areas under German control up to June 1, 1941) = about 5,000,000 tons.

Germany was reported to have had 1,000,000 tons sugar stocks at the outbreak of the war, and has probably added to stocks since then.

15% of German's sugar beet is currently allocated for fodder.

30% (2,400,000 tons) of France's sugar beet is used for alcohol.

measure in preparation of a long and extended campaign in Russia, the scope of which, considering the transport problem, appears to have necessitated the decentralized accumulation of substantial army reserves spread over a vast territory. If present estimated carry-over stocks of meats and fats were to be expressed in terms of army consumption, they may be considered sufficient to cover requirements for six to nine months.

(d) Prospective Supplies, 1941-1942. The outlook for the German food situation in 1941-1942 is fraught with uncertainties. Very much will depend upon the actual outturn of the 1941 harvest in Central Europe. Root crops are probably considerably below the bumper harvest of 1940. Grain crops were late and reduced, quantitatively and qualitatively, by unfavorable weather over most of August. Production will again be below average, as in 1940. If reports of a very high moisture content of the grain requiring special drying should turn out to be truly descriptive of conditions over wide areas of Central Europe, Germany in 1941-1942 would have to make considerable inroads upon the still sizable reserves. It is reported that potatoes will be rationed shortly, largely because of the difficulties of transport which were aggravated by the extension of the war. Supplies of household sugar will continue to be ample. Production and imports of vegetables will probably continue larger, as in 1940-1941, while the improvement in fruits, despite larger import possibilities, may be only slight. The problem of fruit supplies, as well, is greatly complicated by the difficulties of transport.

Hog numbers in the season 1940-1941 in Germany proper have probably been reduced by about 10%, cattle numbers by only about 2%. Meat supplies to the civilian population in 1941-1942 could probably be maintained at present rations, and temporarily perhaps even raised to their previous levels, since the reserves "on the hoof" are still almost untouched. Much, however, will depend on the course of the war and its outlook. In regard to fats, it is doubtful whether present rations will be maintained through 1941-1942, unless supplies from sources previously not accessible to Germany to a large extent were to become available. (Olive oil from Spain may be a case in point.) Domestic production of fats and oils in 1941-1942 will not be higher, and may even be lower, than in 1940-1941; imports from central and northern European countries will also be lower; and domestic reserve stocks can no longer be drawn upon to as great an extent as in 1940-1941.

(e) Outlook for 1941-1942 food situation. On balance, it seems therefore that as the new season opens, German food prospects are somewhat less favorable than they were a year ago. Central European crops in 1941 again appear to have turned out below average. Possibilities for imports and requisitions, after a year of reserve depletion in the countries under German domination, on the whole seem to be reduced, compared to actual takings in 1940-1941. Reserve stocks of fats and, to some extent, grains have also been reduced in Germany proper. Requirements for the expanded armed forces have increased considerably since the early part of 1941. By the same token, the shortages of labor and draftpower in German agriculture have been intensified.

The extension of the war and the campaign against Russia have closed certain supply lines that were open to Germany a year ago. Even though the quantities of grain and vegetable oils received from or via Soviet

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territory in 1940-41 were very moderate, they added up to sizable figures in conjunction with imports from other countries, which in 1941-1942 on the whole are also likely to supply less food to the Germans than in 1940-1941. Germany may also have to supply bread grains to some of the smaller nations which either had obtained, or had arranged to receive, grain from the Soviet Union. Last, but not least, the huge requirements of supplies for the war in Russia have greatly added to the problem of transport and distribution in Germany and other continental countries.

Less favorable food prospects for Germany in regard to 1941-1942 do not mean that the country already faces a serious situation. The morale and physical effects of reduced food allowances vary with the military course of the war and the extent to which the civilian population must live under conditions of actual warfare. Offhand, there is no indication of an inevitable insufficiency of food supplies in 1941-1942. Unless interfered with by action of a military nature, these supplies should still suffice to maintain present levels of consumption of carbohydrates and proteins. A possible reduction in the allowances of fats would probably not reduce consumption to levels as low as obtained in the comparable period of the World War. It should be kept in mind, however, that future policies in regard to the size of the rations, as in the past, will not be dictated by immediate needs of supply conditions alone, but by the long-term outlook as well. Changes in the size of the armed forces, for which a liberal food supply must be assured, changes in the number of work people included in the extra-ration categories, and assumptions as to the duration and the future course of the war are all important determinants. Moreover, the direct impact of war operations upon the supply of foodstuffs and feedstuffs cannot be foreseen.

Lloyds, the British underwriters, published figures in February 1942, indicating that Germany is obtaining large quantities of foodstuffs and other products through French Mediterranean ports in spite of the British blockade.

In making a comparison between the first eight months of 1938 and the same period in 1941, Lloyds' figures showed increases in several important categories, including:

Fruits and vegetables, up from 180,000 to 200,000 tons; coffee, 16,000 to 30,000; cereals, 175,000 to 250,000; and wines, 80,000 to 240,000 tons.

Setting these figures against reports of a considerable food shortage in unoccupied France, British sources concluded it was a clear sign of the extent to which the Germans are diverting imports to their own purposes.

(f) Germany: Statistical Tabulations. 1. Introductory note. The estimates given in the following tables are only tentative. They are based on a detailed examination of all available information.

These estimates for 1940-1941 seem plausible, though they may perhaps somewhat understate available supplies. Thus, imports and requisitions from foreign countries, including those for the German armies of occupation, may have been considerably higher than assumed in the tables. Domestic production in 1940-1941, both of bread grains and of meat, may also

have been larger than assumed.

On the requirements side, rationed consumption has been calculated for the Old Reich population, while for other territories within present German frontiers - Austria, Czechoslovakia, Western and Central Poland, Alsace - only the deficits or surpluses have been considered. Estimated consumption by all German soldiers, whether at home, in occupied territory, or in the field, has been included in total requirements.*

Even on these conservative assumptions regarding the strength of Germany's food position in 1940-1941, existing food reserves still appear to be fairly adequate, though prospects for 1941-1942 are less favorable than they were a year ago for 1940-1941, for reasons stated in the text.

The estimates given of the stocks of bread grains are for total carry-over stocks available in the country, while the estimates of stocks of meats and fats relate only to stocks in government hands; that is, stocks in excess of an ordinary commercial minimum.

* - No exact information is available on the average 1940-1941 number of the armed forces, nor on their average rations in 1940-1941. The rations here applied, those in force in the early part of the season, were later reduced and are probably above the true average. An offsetting factor, as far as total 1940-1941 requirements were concerned, were the low rations assumed for prisoners of war. Those engaged in heavy work are known to have had higher rations, at least in the second half of 1940-1941; again, the true average is not known.

Table 1. Germany: Estimated total consumption of specified foods, 1940-1941, on the basis of existing rations.

Consumer category	Numbers (estimated.)	Rations per year			Total estimated consumption		
		Flour	Meat	Fats	Flour	Meat	Fats
	Million	Kgs.	Kgs.	Kgs.	M. tons	M.tons	M.tons
Normal consumers	29.9	93.6	26.0	13.9	2,799	777	416
Farmers and farm workers	7.4	135.2	29.1	26.0	1,000	215	192
Heavy workers	6.5	148.2	52.0	20.5	963	338	133
Extra heavy workers	1.5	187.2	62.4	38.4	281	94	58
Long and night workers	5.0	117.0	31.2	15.0	585	156	75
Soldiers	5.0	208.0	93.6	31.2	1,040	468	156
Children: 0- 3 years	3.6	57.2	13.0	6.5	206	47	23
3- 6 years	2.9	57.2	13.0	9.8	166	38	28
6-10 years	4.0	72.3	26.0	13.5	289	104	54
10-14 years	4.4	107.1	26.0	13.5	471	114	59
Totals	70.2				a/8,000	2,351	1,194
Prisoners of war and foreign workers	2.5	93.6	26.0	13.9	240	65	36
Grand totals	-	-	-	-	8,240	2,416	1,230
Correction for waste, illicit buying and possible underestimates of numbers included in high ration categories b/					-	500	135
Estimated total consumption in Germany (Old Reich) and by German soldiers at home, in the field, and in occupied areas					8,240	2,916	1,365
(in short tons)					9,100	3,200	1,500

a/ Including 200 for extra rations to adolescents and flour supplement for South Germany.

b/ For details see article on "Food Rationing in Germany" in Foreign Agriculture, October 1941.

Table 2. Germany: Estimated wheat and rye balance, 1940-1941.

Supply	1,000 short tons	Requirements	1,000 short tons
Carryover..... August 1940	6,600	Seed and waste.....	1,550
1940 Crop		Rations for Old Reich population, all German Soldiers, and prisoners of	
Old Reich.....	11,600	war; and foreign workers 9,100	
Imports & Requisitions 1940-1941:		Less 5% allotted in farinaceous foods other than wheat & rye.. 450	
		Net 8,650	
Danube countries 250		Less 5% potato flour admixture.. 450	
Russia..... 200		Net wheat and rye flour 8,200	
Western Poland.. 350	800		
		In terms of grain at 80 percent extraction	10,250
		Austrian deficit 1940-1941.....	450
		Sudetenland and Protectorate Deficit 1940-1941.....	200
		Feeding of 1940 bread brains not usable for human consumption	800
		Sundry requirments (for Alsace, and some other countries)	350
		Carry-over August 1941	5,400
	19,000		19,000

Table 3. Germany: Estimated meat balance, 1940-1941.

Supply	1,000 Short tons	Requirements	1,000 Short tons
Carry over August 1940 a/	100	Rations for Old Reich population, all German soldiers, prisoners of war and foreign workers.....	3,200
Domestic production 1940-1941: Currently produced from feedstuffs fed in 1940 1941 b/ ..	2,750	Deficit: Austria & Czechoslovakia	165
Supply added by reduction in numbers during 1940 1941 c/	275		
Imports and Requisitions 1940-1941:		Carry-over August 1941 a/ ...	290
Denmark 200			
Netherlands 110			
Danube countries 110			
Other countries 55	475		
Supply of fats in sausages and other charcuteries sold as meat	55		
	3,655		3,655

a/ In Government hands.
b/ Pre-war production: 3,300; less 16 percent because of less feed.
c/ Reductions: hogs 10 percent, cattle 2 percent.

Table 4. German: Estimated fats and oils balance, 1940-1941.

Supply		1,000 short tons	Requirements	1,000 short tons
Carryover August 1940 a/		500	Rations for Old Reich population, all German soldiers, and prisoners of war, and foreign workers.....	1,500
Domestic production 1940-1941				
Butter	600			
Edible oils	20			
Pure vegetable fats	-		Deficit: Austria and Czechoslovakia	120
Margarine, etc.	30			
Hog fat	400		Supply of fats for sausages and other charcuteries consumed as meat	55
Edible tallow	50	1,100		
Imports and requisitions 1940-1941 -			Carry-over August 1941 a/ ...	180
Butter:				
Denmark	90			
Other countries	55	145		
Lard and fatbacks		55		
Margarine (from imported oilseeds)		20		
Edible oils (olive oil from Italy and Spain)		35		
		255		
		1,855		1,855

a/ In Government hands.

Table 5. German food rations. Thirtieth four-weeks' period, 17th November to 14th December 1941. (Average weekly rations in grammes - oz. in brackets).

	Normal Consumers	Heavy Workers	Very Heavy Workers	Children and Young Consumers			
				Under 6	6 - 10	10 - 14	14 - 20
Bread*	2,250 (80)	3,650 (129)	4,650 (184)	1,100** (39)	1,700 (60)	2,600 (92)	2,600 (92)
Meat and meat products	400 (14)	800 (28)	1,000 (35)	250 (8-3/4)	Same as normal consumers.		
				Under 3	3 - 6	6 - 14	14 - 18
Butter	125.0 (4½)	125.0 (4½)	125.0 (4½)	125.0 (4½)	187.5 (6-3/4)	187.5 (6-3/4)	156.5 (5½)
Margarine †	113.5 (4)	176.5 (6)	238.5 (8½)	Nil	Nil	78.0 (2-3/4)	113.0 (4)
Pig Fat††	31.5 (1)	94.0 (3½)	375.0 (13)	Nil	Nil	Nil	31.5 (1)
Total fats	270.0 (9½)	395.5 (14)	738.5 (26)	125.0 (4½)	187.5 (6-3/4)	265.5 (9½)	301.0 (10½)

Cheese or Quark	All consumers 31 (1) and Quark 31 (1) " " 94 (3)
Sugar	" " 225 (8)
Jamø	" " 175 (6) except children 6 - 14 who get 225 (8)
"Nahrmittel" (cereal products, alimentary pastes, potato starch flour etc.)	" " 150 (5¼)
Coffee substitutes	" " 100 (3½)

Whole milk (litres - pints in brackets)	Children under 3,	0.75 (1.3) daily
	" 3 - 6	0.50 (0.9) "
	" 6 - 14	0.25 (0.4) "
	Expectant, lying in and nursing mothers	0.50 (0.9) "
	Workers in unhealthy occupations.	0.50 (0.9) "

Other rations. Artificial honey 31 (1) Children 62 (2) Cocoa powder 15 (½) children only. Eggs, 1 per person per week.

* Or flour on certain coupons (25% reduction) or cake, pastries and biscuits.
**Or infants' food. † Or edible oil) On specified coupons, subject to 20% reduction.
ø Or 112 (4) sugar †† Or lard)

(g) Increase in Vegetable Acreage. During the past two years Germany's acreage under vegetables increased by 50,000 hectares (or 37%) to 188,000, and counting the province of Warthegau and Danzig, Eastern Prussia, it totaled 201,000 hectares last spring. All vegetables, with the exception of onions and horse-radish, have been cultivated in greater quantities, especially spinach, cabbage, kohlrabi, carrots and peas. Green cabbage, spinach and mangold acreages were increased by nearly 100%, kohlrabi by 80%, cauliflower 59% and savoy cabbage and Brussels sprouts by about 35%. The rainy summer resulted in a bad crop of tomatoes, but carrot and salad crops were abundant. Notwithstanding a strict control of the vegetable market certain shortages were inevitable. The fact that the potato crop was late and not up to expectation again increased the demand for more vegetables.

Italy and Holland are, with the Balkan countries, Germany's main suppliers of imported vegetables. Italy's own consumption has increased and exports during the past few months have had to be cut down, but it is expected that Italy will be able to continue to supply principally cauliflower, tomatoes, and early spring vegetables. Holland, on the other hand, is producing a great amount of vegetables and 55% of her production is earmarked for export to Germany. Holland's exports of mainly tomatoes, cucumbers, and cabbage, sold to Germany at Germany's inland prices, formed 75% of total imports during 1941. In 1942, Holland plans to increase her total production from 550,000 to 670,000 tons.

Germany's actual annual consumption of vegetables is estimated at six million tons, of which only 7% are imported. The home production is estimated at 1.7 million tons produced by small truck gardeners, and 3.9 million tons by large specialized truck farmers. Every method of improving production has to be examined. In Holland, for instance, production averages 23 tons per hectare, whereas in Germany it is only 19 tons.

During the coming year, professional vegetable growers must increase their acreage by another 50,000 hectares. Flower gardeners whose flower acreage has already been considerably reduced, must sacrifice at least another 50% for early vegetables to be harvested between the middle of February and the end of May; later in the season 15% of grass land and 40% of open lands must be cultivated. Special attention must be paid to vegetables that "economize" cooking fats, such as cucumbers and salad, and to others such as cauliflower "which make the lack of meat less noticeable."

(h) Mechanization of Agriculture. Some idea of the advances made in the use of machines for German agriculture and forestry may be seen in the following tables, which appeared in Der Deutsche Volkswirt, March 7, 1941.

Table I.

Number of self-propelled machines in German agriculture and forestry.

	1907	1925	1933	1939	Percentual change 1933/39
Seeding-Machines.....	204,995	508,876	614,444	717,928	/ 16.8
Manure-Spreaders.....	-	106,174	147,287	225,892	/ 53.4

Table I. (contd.)

	1907	1925	1933	1939	Percentual change 1933/39
Mowing-Machines for Grass and Grain.....	307,285	1,023,092	1,313,355	1,582,543	/ 20.5
of these, binders...	--	131,199	192,963	307,620	/ 59.4
Potato-Diggers.....	10,062	173,665	329,973	433,672	/ 31.4
Tractors,					
Small Tractors,					
Power-Mowers, and small Mills (total)...	-	-	24,183	65,928	/172.6
Threshing-Machines (electric powered)..	16,644	577,267	764,779	839,449	/ 9.8
Threshing-Machines (horse powered).....	715,671	477,200	240,829	126,807	- 47.3
Grinders.....	25,559	320,354	448,936	585,802	/ 30.5
Hoists,					
Grip-Hoists, and Blowers.....	-	-	63,897	157,301	/146.2
Steam-Engines.....	-	16,419	15,587	9,683	- 37.9
Electro-Motors.....	-	745,613	1,175,408	1,647,793	/ 40.2
Fodder-Silos.....	-	-	13,855	337,404	/233.5

(Arranged according to the publication of the Statistical Office of the Reich).

/ = + (plus)

Table II.

Percentual change in 1933, as compared with 1925.

	0.51 to 5 ha*	5 to 20 ha	20 to 100 ha	100 and more ha	TOTAL
Seeding-Machines ..	↗ 60.8	↗ 62.6	↗ 52.2	↗ 27.4	↗ 56.9
Manure-Spreaders ..	- 3.7	↗115.8	↗ 46.8	- 9.0	↗ 38.5
Mowing Machines of all kinds.....	↗ 71.1	↗ 49.1	↗ 13.1	- 9.3	↗ 27.8
with binders.....	- 55.8	↗ 70.5	↗ 65.8	↗ 3.7	↗ 47.0
Potato Diggers.....	↗277.4	↗156.8	↗ 57.1	↗ 9.1	↗ 89.4
Threshing Machines with power.....	↗ 29.6	↗ 40.7	↗ 22.4	- 10.5	↗ 31.5
horse-powered....	- 59.8	- 42.9	- 57.1	- 77.2	- 49.6
Grinders.....	↗ 34.3	↗ 55.1	↗ 30.3	- 5.0	↗ 39.6

* - ha -- hectare -- 2.471 acres.
(According to the Statistical Office of the Reich).

b. Mining and Metallurgy.

(1) Aluminum - (Bauxite). With the campaigns of 1940 and 1941, Germany has assured herself of a self-sufficiency with regard to aluminum. France, Hungary, Yugoslavia, and Italy together produce almost 60% of the worlds supply of bauxite. France alone is estimated to have a reserve of 60,000,000 tons of bauxite, which will last 100 years at the present rate of production.

European capacity for making aluminum is about 500,000 tons (Germany: 285,000; France: 70,000; Norway: 40,000; Italy: 50,000; and Switzerland: 30,000 tons).

German consumption of aluminum is now about 325,000 tons a year, and of this, 30-40,000 tons can be provided by collected scrap. Pre-war consumption in the rest of Europe was about 100,000 tons a year.

A recent study presents the following figures, showing the Axis supply of Bauxite and plant capacity available for production of Alumina and Aluminum for 1942.

Bauxite	2,600,000 tons.
Alumina capacity	950,000 tons.
Aluminum capacity	475,000 tons.

(2) Antimony. The combined production of the antimony mines known to be operating at the outbreak of the war in enemy occupied and controlled territory, including North Africa, is estimated to amount to about 6,750 tons, (metal content), while up to 1,000 tons additional could be available from adjacent neutral sources.

The smelter capacity of these territories is estimated at 10,250 tons.

Stocks available in Europe on January 1, 1940 = about 3,650 tons.

Requirements are estimated as follows:

Germany ----------	5,000	tons	per	annum
Italy ----------	1,000	"	"	"
France ----------	500	"	"	"
Belgium ----------	100	"	"	"
Yugoslavia ----------	100	"	"	"
Hungary ----------	75	"	"	"
Greece ----------	50	"	"	"
Bulgaria ----------	25	"	"	"
Total -------	6,850	"	"	"

According to information supplied by the Campine smelters in February 1940, Germany, by her invasion of Belgium in 1940, acquired stocks of metal or metal as ore amounting to 2,000 tons, while France is believed to have yielded another 1,000 tons. It is estimated that, in the following year, the overrunning of Yugoslavia produced a further 250 tons as loot, apart from control of output. The supply position up to the end of 1941 may, therefore, be stated as follows:

	Tons.
Estimated Stock as on 1-1-40 ----------	3,650
Supplies in 1940.	
Imports from Yugoslavia ----------	1,300 (actual figures 1,305)
Hungarian, Czeche-Slovakian & Austrian output	3,000
Italian output ----------	500
French output (partial) ----------	150
Loot in France and Belgium ----------	3,000
Total supplies available	11,600
Less consumption of German Europe --------	6,850
Stock on 1-1-41 ----------	4,750
Supplies in 1941.	
Italian output ----------	500
Austrian, Hungarian and Czech output -----	3,000
French output ----------	250
Yugoslav output ----------	2,000

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Supplies in 1941. (Continued)

Yugoslav stocks (loot)	250
Algerian output (potential mainly)	1,000
Total supplies available	11,750
Less consumption	6,850
Stock on 1-1-42	4,900

It would appear, therefore, that the Axis Powers have been able, in fact, to increase their stocks of antimony since the outbreak of the war, and that, although this may have been brought about largely by the tonnages captured in the overrun countries, the supply position is only about 1,000 tons a year less than estimated requirements. With a stock of 5,000 tons in hand; with a margin for reduction in demand by curtailment of the amounts allocated to the occupied territories; and with the possibility of supplies from Turkey and Portugal, and from scrap material, it is clear that the Axis position in antimony cannot be one of difficulty for them. The picture, however, might be quite another one if shell came to be used by them on anything like the scale of the last war.

(3) Beryllium. Germany has pioneered in the production of beryllium alloys. As early as 1930 she was using the metal in copper wire, and by this means was able to ease the copper requirements. She may now be using beryllium to replace molybdenum and tungsten in the production of steel. Germany imported 1160 tons of beryl ore from Brazil in 1940. (This was about two-thirds of Brazil's total output.) There is evidence that Germany is attempting, through various channels, to increase her supplies. There is no information regarding her stock-pile.

(4) Cadmium. It was necessary for Germany to import cadmium before the war. We have no knowledge of her stock-pile, which was probably large to judge by Germany's long preparation for war.

(5) Chromium. There is no doubt that a shortage of chromium exists, and Germany has had to resort to substitutes for steel-hardening. It is not expected, however, that this shortage will affect her industrial effort immediately. Germany has access to the chromium produced in Yugoslavia and Greece, but actual independence can only be obtained by gaining control of Turkey's great production areas.

Unsuccessful attempts were made in October 1941 to obtain immediate shipments of chrome. Turkey, however, stood by her contractual agreements with Great Britain, which has an option on the entire Turkish production of chrome until 1943, after which Turkey has agreed to supply Germany with a total of 180,000 tons from the 15th of January 1943 to the end of 1944.

(6) Cobalt. The European Axis requirement of cobalt element at the present time is about 510 tons per annum.

If further Fischer Tropsch installations using cobalt catalysts are set up, these requirements will be increased both by the amount of cobalt to be installed as catalyst and the current amount required to renew it.

The Axis plans with regard to such installations are not

known at the moment, but if Fischer Tropsch capacity were increased during 1942 by 10% (the amount of increase in 1941) a further 120 tons, with replacement at the rate of 6 tons per annum would be required.

It is estimated that at the 31st December, 1941, Germany had a stock of cobalt element amounting to about 200 tons.

Provided supplies from Finland can be maintained, Germany should have a current supply of about 300 tons of cobalt element during 1942.

Stocks and current supply should accordingly just about balance current requirements (excluding new Fischer Tropsch installations) during 1942. Germany will have to take steps to obtain supplies from French Morocco if she is to increase the Fischer Tropsch capacity, and if she is to avoid being completely without stocks, with cover for only 60% of her requirements, at the end of 1942.

Control over French Moroccan supplies is accordingly of very great importance to Germany.

Germany has at her disposal in her own country and occupied territories ample capacity to produce cobalt element, granted the necessary supplies of ore or concentrates.

(7) Copper. Germany's total refinery capacity is about 300,000 tons, consisting of 150,000 tons electrolytic and 150,000 tons fire refining capacities. She has a wire drawing capacity of 165,000 tons.

A study of the Axis copper situation for 1942 estimated that the war effort would consume over 300,000 tons as compared with a total production plus stocks of some 25,000 tons less than this requirement. It was estimated, as of March 1, 1941, that Germany's minimum annual war requirement of copper amounted to 160,000 metric tons. Other estimates range to over 200,000 tons. It has also been estimated that Germany had 166,000 metric tons of copper in reserve as of March 1, 1941. Already there are severe restrictions on the industrial use of the metal, and an unestimated amount has been taken from private homes and buildings in the form of equipment, utensils, and fixtures.

Just how far Germany has gone, or can go, in the substitution of aluminum for copper is unknown. This substitution seems to have begun in the World War when aluminum conductors were introduced in large rotating apparatus, windings, and in some transformers. Since the outbreak of World War II, aluminum wire has been substituted for copper in all commercial and domestic uses and it is only in the manufacture of aircraft and for other essential military purposes that copper wire is still permitted.

The only drawback in connection with the substitution of aluminum for copper seems to be the enormous consumption of electrical energy necessary to produce aluminum. Whereas only 300 K.W.H. were required to refine one ton of copper, some 20,000 K.W.H. are necessary to produce one ton of aluminum.

Since Germany now controls most of the bauxite in the world, the only problem would seem to be the additional strain on electrical industry. Nevertheless, it seems to be the consensus of opinion that the shortage of copper is the most serious deficiency confronting Germany today.

A German press item on February 20, 1942, stated that 3980 tons of pure copper should be recovered by the substitution of zinc for copper coins.

It should be noted that for the past ten years Germany has been using the wonderful properties of beryllium for copper wire, making it possible to use less copper.

If Germany conquers the European portion of Russia, it will control deposits which produced 115,000 tons of copper in 1938. It was reported in January 1942 that the Norwegian copper smelting plant at Sulitjelma was likely to produce 8,000 tons of blister copper, and 9,500 tons of zinc concentrate during 1942, or about 35% beyond any former volume of production. The Röros mine is undergoing expansion. It has been reported that the Bor Mines in Yugoslavia might be in operation by March or April 1942. From the same source it was learned that an improvement in the copper situation might be deduced from the fact that copper from Rio Tinte, Spain was reaching Hungary.

(8) Gallium. Germany claimed a virtual world monopoly of gallium, which is used as backing for optical mirrors and as alloy for dental fillings.

(9) Graphite. Austria will be able to satisfy this requirement.

(10) Lead. In regard to lead, there is again some divergence of opinion. The best available data, however, seem to indicate that Germany has now established, or approached, full self-sufficiency with regard to lead. Yugoslavia, Spain, and Sweden, all in Germany's orbit, should be able to assure the latter of an adequate supply. The total amount of lead taken as booty is unknown, although she is reported to have seized 11,000 tons in the campaign in France, Belgium, and Holland.

Axis production of lead plus stocks of about 400,000 tons are more than sufficient to balance an estimated war consumption of about 350,000 tons.

(11) Magnesium. German production of magnesium was 14,000 tons in 1938, about 18,000 tons in 1939, and is estimated by the U.S. Bureau of Mines not to have exceeded 21,000 tons in 1940. However, the balance of opinion is that production in 1940 was well up to the estimated capacity of 40,000 tons.

Germany has access to huge deposits of magnesite in Austria, Greece, Czechoslovakia, and Yugoslavia. It is probable, however, that the bulk of Germany's magnesium is now being produced from dolomite of which there is an inexhaustible supply. Moreover, there is almost unlimited carnallite (from the aspect of magnesium production) in the Strassfurt deposits.

German consumption of magnesium in 1940 was probably not much more than 20,000 tons, and was made up principally as follows: explosives and incendiary materials, 10,000 tons; aircraft construction, 5,000 tons; land and sea transport, 2-3,000 tons; and aluminum-magnesium alloys, 2,000 tons. There is evidence that both Germany and Italy have magnesium to spare.

(12) Manganese. The capture of the Nikopol district of the Ukraine gives Germany access to deposits representing at least 24% of the world's production, and should assure Germany of a full self-sufficiency within a year. Deposits at Nikopol are estimated at 400 million tons, and production from this area amounted to about 1 million tons manganese.

A reliable report estimated that Germany had three years' supply of manganese on hand in 1939.

(13) Mercury. Germany can probably obtain adequate supplies from Spain and Italy, which together produce about two-thirds of the world's total.

(14) Molybdenum. Statistics with regard to molybdenum are scarce. Germany's present sources are Norway, Italy, Finland, and possibly Yugoslavia. There are no reliable figures as to the amounts produced, but it is known that mines are being developed. Likewise, it is not known how much molybdenum Germany requires, or to what extent substitutes are being employed, nor the amount of reserves on hand.

The consensus of opinion is that the metal is scarce and Germany's stocks are low, but up to the present there is no evidence of a fatal shortage.

(15) Nickel. It has been estimated that Germany requires a minimum 13,000 metric tons of nickel annually for her war effort. She is reported to have had on March 1, 1941, about 12,000 metric tons in reserve. It is not expected that Norway, Greece, and Italy can satisfy Germany's deficiency in nickel. Her own production is totally inadequate. However, Germany has employed substitutes including molybdenum, chromium, and zinc for years; and at least in the case of zinc, she has a full self-sufficiency.

A recent study showed that the total annual production of Europe is not likely to exceed 5,000 tons. In the same report Axis annual requirements were placed at 20,000 tons. Thus her position for 1942 depends upon her stocks and an increased use of substitutes. This is unquestionably one of Germany's major problems.

Since Europe produces very little nickel, it is believed that a serious shortage exists. The output of the Petsamo nickel mine was estimated, by a reliable person who visited the mine at the beginning of March 1941, at roughly 960 tons of ore per day. According to the Minerals Yearbook, 1938, there were between 3,000,000 and 4,000,000 tons of ore reserves in this district, with a nickel content of 2%.

(16) Radium. Production and requirements are unknown. By her annexation of Czechoslovakia, Germany acquired world-famous radium mines.

(17) Salt. Germany produced some 3,000,000 tons in 1937, and 46 mines were producing salt. She was able to export one-fourth of her production; consequently, there can be no problem here.

(18) Tin. It is estimated that Germany requires a minimum of 13,000 metric tons annually for her war effort, and that on March 1, 1941, she had 14,500 metric tons in reserve. Since most of the European countries depend upon imports of tin, and since Germany is trying to develop her own low-grade deposits, there is every evidence of a great deficiency with respect to tin.

(19) Tungsten (Wolfram). As with molybdenum, there is no reliable information regarding the supply or requirements of tungsten. Asiatic sources have been severed by the closing of Trans-Siberian route. Evidence seems to indicate that, in addition to the production in Portugal, Germany has also obtained quantities from South America, notably Bolivia, and may still be getting some through the blockade, directly from South

America. Undoubtedly, Germany had large war reserves. Portugal's current production of tungsten is estimated at 470 tons monthly, of which 40% goes to Germany and 60% to Britain.

(20) Uranium. In her conquest of Czechoslovakia, Germany acquired the world-famous uranium mines at Joachimsthal, where the original radium recovered by Mme. Curie in 1902 was mined. Portugal also produces uranium. There is no reason to believe that any deficiency exists in this respect.

(21) Vanadium. Vanadium is used principally in the manufacture of special alloy steels and irons. It has been reported that Germany has been successful in obtaining vanadium from low-grade "Dogger" iron ores, and it is stated that the new process would enable Germany to obtain all of its current requirements (1938) of around 15,000 metric tons from domestic production.

It has also been reported that Russia was close to self-sufficiency in vanadium, and was known to be making extensive efforts to extract it from magnetites.

(22) Zinc. Germany now has access to the zinc supplies of most of the continent. The venture into Poland made her practically self-sufficient in this metal, and she can likewise draw on the large production of Italy, Spain, Yugoslavia, and Sweden.

Europe accounts for approximately 24% of the world production. Germany's production of zinc in 1938 was 195,000 tons, and the remaining requirements were met from Austria, Czechoslovakia, and Southeastern Europe.

Axis production of between 400,000 and 500,000 tons of zinc with stocks possibly as high as 400,000 tons considerably outweigh an estimated war-consumption of 450,000 tons.

(23) Summary. With regard to metals the following conclusions seem warranted.

(a) Germany has attained a full or satisfactory self-sufficiency in:

1. antimony
2. bauxite
3. iron
4. lead
5. magnesium
6. manganese
7. mercury
8. sulphur
9. titanium
10. zinc

(b) There probably exists a shortage of:

1. copper
2. molybdenum
3. nickel
4. tin
5. tungsten

(c) The exact amount of booty stocks or shipments through the blockade cannot be estimated, which makes it impossible to determine

any immediate, critical situation.

(24) Petroleum. Since the beginning of the war with England in 1939, a veritable deluge of reports and studies concerning the Axis oil position has led to confusion regarding this most important problem.

From the mass of rumors, reliable reports, and conferences with well informed experts, certain conclusions have, nevertheless, been reached. Although these conclusions may be challenged, they are based on the consensus of valid opinions, and give as accurate a picture of the oil situation as is possible in the welter of secrecy, rumor, and fact.

(a) Oil Production. Germany has a considerable production of her own. She has also made remarkable progress in the production of synthetic oil. Estimates of synthetic oil production alone are about 4,000,000 tons per year, although one estimate is as high as 12,000,000 tons per year, which is, of course, fantastic. Recent evidence indicates a possible synthetic production of 6,000,000 tons for 1942.

It was reported in January 1942 that 20 new factories are in construction for the production of synthetic benzine, in Bohemia in the region of Dux and Brüx. They are expected to begin production in the spring of 1942. Altogether 4,000,000 tons a year are to be produced.

There has been more disagreement concerning the oil supplies available to Germany than almost any other strategic raw material. For this reason the following table and statistics are presented, based on information from the Standard Oil Company in December 1941.

CONTINENTAL EUROPE, EXCLUDING RUSSIA, SPAIN & PORTUGAL

ESTIMATED DOMESTIC SUPPLIES - CRUDE & PRODUCTS

LAST HALF OF 1941

Barrels 42's*

Country	Crude Oil Production Minimum	Crude Oil Production Maximum	Natural Gasoline Benzol & Alcohol Minimum	Natural Gasoline Benzol & Alcohol Maximum	Synthetic Oil Minimum	Synthetic Oil Maximum	Total Domestic Supplies Minimum	Total Domestic Supplies Maximum
Albania	1,000,000	1,100,000	-	-	-	-	1,000,000	1,000,000
Belgium	-	-	75,000	75,000	-	-	75,000	75,000
Bulgaria	-	-	-	-	-	-	-	-
Denmark	-	-	-	-	-	-	-	-
Finland	-	-	5,000	5,000	-	-	5,000	5,000
France	-	-	500,000	500,000	90,000	90,000	590,000	590,000
Germany	5,890,000	7,500,000	1,495,000	2,000,000	12,910,000	16,000,000	20,295,000	25,500,000
Greece	-	-	-	-	-	-	-	-
Hungary**	1,750,000	2,015,000	75,000	80,000	-	-	1,825,000	2,095,000
Italy	40,000	40,000	25,000	25,000	-	-	65,000	65,000
Netherlands	-	-	35,000	35,000	-	-	35,000	35,000
Norway	-	-	-	-	-	-	-	-
Rumania	18,500,000	20,650,000	1,000,000	1,100,000	-	-	19,500,000	21,750,000
Sweden	-	-	75,000	75,000	-	-	75,000	75,000
Switzerland	-	-	15,000	15,000	-	-	15,000	15,000
Yugoslavia	-	-	-	-	-	-	-	-
Totals	27,180,000	31,305,000	3,300,000	3,910,000	13,000,000	16,090,000	43,480,000	51,305,000
Daily Average	147,717	170,135	17,935	21,250	70,652	87,446	236,304	278,831

* A conversion factor of approximately 7 barrels per ton may be used.

** There is considerable evidence that Hungary's production is higher than this. It is reliably stated that current production = 9,000 barrels per day (3,285,000 barrels per year or about 469,286 tons). An increase of 67.50% in Maort production was due primarily to the Lovaszi field which started producing in December 1940.

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Summarized, the possible minimum and maximum supplies available are as follows:

Barrels 42's and Tons Last Half of 1941

SUPPLIES	Minimum		Maximum	
	Barrels	Tons	Barrels	Tons
Crude Oil Production	27,180,000	(3,882,000)	31,305,000	(4,470,000)
Natural Gasoline, Benzol, etc.	3,300,000	(471,500)	3,910,000	(558,000)
Synthetic Oil	13,000,000	(1,857,000)	16,090,000	(2,298,000)
Total Domestic Supplies	43,480,000	(6,210,000)	51,305,000	(7,330,000)
Monthly Average	7,247,000	(1,034,000)	8,551,000	(1,221,000)

To show indicated supplies for the first six months of 1942, estimates and comparison are as follows:

SUPPLIES	Per Day Last 6 months 1941		Per Day First 6 months 1942	
	Barrels	Tons	Barrels	Tons
Total crude oil Production	171,000	(24,420)	194,000	(27,700)
Natural gasoline, benzol, etc.	21,000	(3,000)	21,000	(3,000)
Synthetic oil from coal	88,000	(12,570)	110,000	(15,710)
Totals	280,000	(40,000)	325,000	(46,400)
Tons per year		(14,600,000)		(16,940,000)

The increase in crude oil production is the assumed potential increase in production from Rumania. For the last six months of 1941 this was estimated at 112,000 barrels per day. The best producing advice is that while it might be possible by intensive drilling to increase Rumanian production temporarily to as much as 150,000 barrels per day, this could not be maintained over any appreciable period. Accordingly, Rumanian production has been estimated to increase from 112,000 to 135,000 barrels per day for the first six months of 1942.

Synthetic oil production from coal and coal derivatives is based on an estimated average production during the first six months of 1942 at the rate of 110,000 barrels per day, compared with an estimated production rate at the beginning of the year of slightly under 100,000 barrels per day.

One study presents the following table:

Estimated Annual Output of German Synthetic Plants[1] in Tons

Plant	Total Crude Capacity	Gasolene (or gasoline equivalent output)	Other Products
Bergius	4,485,000	3,000,000	1,485,000
Fischer-Tropsche	1,560,000	11,000,000[2]	560,000
2) Miscellaneous Processes	2,550,000	1,800,000[3]	750,000 T
Total	8,595,000	5,800,000	2,795,000

1. Data from a highly confidential source.
2. Gasolene
3. Gasolene equivalent - for "gasogene" vehicles, etc.

1. A recent British estimate of supplies upon which Germany can draw lists the following:

Rumania ..... 445,000 tons per month
Synthetic ..... 440,000 tons per month
Other fields ..... 130,000 tons per month
Total.. 1,015,000 tons per month

2. Lubricating Oil Supplies. The total lubricating oil production and imports for 1940, for Continental Europe, excluding Russia, Spain, and Portugal is estimated at 3,535,000 barrels. (About 505,000 tons)

For 1941 the estimate is 4,890,000 barrels (about 698,570 tons).

The normal peacetime consumption of lubricating oils for German controlled areas in Europe is about 9,500,000 barrels yearly. (about 1,357,143 tons.)

The estimates of the total potential lubricating oil capacity of Germany and the annexed or Axis-controlled areas for 1941, are as follows:

Germany	453,000	metric tons
Italy and Rumania	134,000	" "
Total	587,000	" "

For comparison the following excerpt is taken from a study of German lubricants in February 1942.

"Based on the last production data available (1938-1940) the present crude oil production of the Axis countries is about 60 million barrels annually. Although an average yield of 15 percent (9 million barrels) lubricating oils might be expected, it appears likely that limitations in transportation, manufacturing, etc., would result in a figure of only around 6-7 million barrels annually."

(b) Oil Consumption.

1. Rumania consumes about 20% of her own production for internal use.

2. The British estimate that Germany is currently consuming 1,375,000 tons per month, which, according to their statistics, exceeds production by 360,000 tons per month. Their estimate is broken down as follows:

Civil consumption (including occupied countries)	660,000 tons per month*
Military forces	460,000 tons per month
Air forces	135,000 tons per month*
Naval forces	100,000 tons per month*
Total	1,375,000 tons per month

3. A reasonable estimate of oil consumption on the Eastern Front to date (November 22, 1941) would be a maximum 435,000 tons per month.

4. Consumption of oil by privately owned cars is practically nil. Commercial vehicles have now been adapted to the new gas-generator, using peat, wood, or coke as a fuel;**and new trucks, beginning in October 1941 are being thus equipped at the factory. The program has been extended to the occupied areas. For instance, items appearing in official German publications state that in the fall of 1941 gasoline and diesel trucks in Belgium were being converted to use producer-gas and would be supplied with solid fuels of domestic origin, notably anthracite and wood. Likewise small motor ships of the Netherlands were to be equipped with producer-gas plants. The Netherland authorities were to grant loans to ship-owners for this purpose, to be repaid in monthly installments.

It has also been reported that Germany has ordered producer-gas apparatus for mechanical transport on the Russian front. This may be an indication that Germany is using every effort to conserve her petroleum supplies in anticipation of a longer war.

(c) Transportation of Oil. In the early months of the war, transportation was the greatest bottle-neck in Germany's supply of oil. By July 1941, however, it was reported that, for the first time since the war began, the Rumanian production was less than the transport capacity to Germany. Since little damage apparently has been done to the transportation systems and only minor damage to the refineries, it is safe to say that Germany is making full use of Rumania's capacity for export.

With the Danube open, the total capacity for export by barge and rail is between 500,000 and 600,000 tons per month, which is in excess of actual production.

* These figures seem excessive. It is our opinion that not more than 500,000 tons per month are used for industrial consumption.
** See Page 58.

Reliable reports indicate that Germany has been receiving about 500,000 tons per month by rail and the Danube. It has been estimated that the capacity of the Danube amounts to about 375,000 tons per month.

By the end of June, 1941, the Germans had reorganized their transport system and during the months of July, August and September, they were transporting to Germany petroleum products at a rate of 500,000 tons per month. This was achieved in the following manner:

		PER DAY (tons)	PER MONTH (tons)
By Rail to Germany			
13 trains per day @500 tons		6,500	195,000
By Danube			
Pipeline to Guirgi		5,000	
10 trains per day to Guirgi @ 700 tons		7,000	
		12,000	360,000
			555,000
Of Which to Italy	40,000		
Switzerland	12,000		
Bulgaria	3,000		-55,000
Germany			500,000
To the Russian front via tank car, per month			60,000/90,000

(d) Conclusions. It is probable that Germany and the occupied countries are consuming as much oil as they produce. It is even possible that Germany is drawing on her stocks of oil. Nevertheless, there is no substantial evidence of, nor reason to believe, that any curtailment in her military effort is imminent due to lack of oil supplies. On the contrary, a lifting of rationing restrictions on use of Treibgas, a by-product of synthetic gasoline, in October 1941, indicates an improvement in the German fuel situation by the utilization of domestic raw materials.

German interests are studying the possibilities of developing the large deposits of oil shale in Northern Esthonia. It is stated that the proved reserves in oil shale here amount to 4,500,000,000 and 6,000,000,000 tons.

There are many reasons why Germany's petroleum position in 1942 cannot be accurately determined. They may be summed up in our lack of knowledge concerning the following:

1. Stocks on hand before and after each campaign;
2. The amount of oil taken as booty;
3. The increase in synthetic production;
4. Military and civilian consumption.

Until more accurate evidence is available on these subjects, it will be impossible to predict the critical period in Germany's position. It

seems reasonable to believe that Germany will have sufficient supplies for her military efforts in 1942, and that, at the present, due to the let-down in tempo, may even be adding to her reserves. Further non-military restrictions, and possibly severe curtailment in occupied countries, seems inevitable.

A German organization, the WIFO Wirtschaftliche Forschungs Aktien Gesellschaft (Economic Research Joint-stock Company), has control of the Belgian refining and petroleum processing concerns, and has chosen the region of Ghent as its distributing center.

(25) Coal and Coke. Due to the acquisition of the entire Upper Silesian Coal Basin, Germany in 1939, for the first time, ranked first in Europe in coal production. At that time the Reich's output of bituminous coal of 186,000,000 tons (1938) was increased by about 55,000,000 tons, bringing the total output of Greater Germany to about 240,000,000 tons.

The conquests of the coal mines of Holland, Belgium, and northern France in 1940 brought all the principal coal districts of continental Europe, with the exception of those of Russia, under the control of the Reich. By the end of 1940 the damage done to the mines and to transportation facilities had been repaired and normal work had been resumed.

The coal situation was, nevertheless, strained in 1940 for three main reasons: (a) difficulties in transportation due to the freezing of all internal waterways in the severe winter of 1939-40, (b) the necessity for supplying the northern, and southeastern countries which had been cut off from English supplies, together with supplying Italy 1,000,000 metric tons per month, and (c) the increased production of synthetic gasoline, notably from lignite.

By the end of 1941 the coal situation had eased considerably, except for the inability to meet all the demands of the occupied countries. It may be said that the position with regard to coal is now satisfactory for Germany. By 1941 Germany was producing about 500,000,000 tons per year.

The German controlled countries together produced between 600 and 700 million tons of coal in 1940.

The only problem at present seems to lie in a shortage of coking coal for the steel industries, and there may be a shortage of coke in Germany which the occupied territories cannot satisfy, since they are importers and need what they have for the vital metallurgical industries.

An interesting development in 1941 was the establishment of a coal-products combine corporation (Aktiengesellschaft der Kohlenwertstoff-Verbände) in Bochum representing a merger of all the combines engaged in the exploitation of the by-products of mining. Coal, as is well known, is the basis of benzol production.

The DEUTSCHE BERGWERKS ZEITUNG stated that the Belgian Minister of Economy announced that Belgian state coal mines had a peak production of 250,000 metric tons in December, 1941.

3. Manufacturing.

a. Hermann Goering Works.

One of the most important developments for German industry was the founding of the Hermann Goering Works. Originally designed to exploit the low-grade ores in Germany, this organization has expanded rapidly in the last year. The Hermann Goering Works has become the largest industrial concern of Greater Germany, employing about 600,000 workers, eclipsing, therefore, both the I.G. Farbenindustrie and the Siemens concern. In production it far exceeds the Krupp Company, heretofore the largest manufacturers of implements of war.

The whole concern has been divided into three operating units which unite mining, metallurgical, munitions, and shipping interests.

In its expansion during the last three years, the Hermann Goering concern has absorbed the world-famous Skoda works, the leading arms and munitions factory of Czechoslovakia. Previously it had taken over the Alpine-Montangesellschaft of Austria (iron ore) and the Danube shipping company, and has acquired control of the Reschitza Steel Works of Rumania and the copper mines de Bor in Yugoslavia.

In addition to the steel works, mines, shipping companies, arms and munitions, the Reichswerke A. G. Hermann Goering now take in machinery and automobile factories.

b. Steel. Military successes in 1939 and 1940 increased the Reich's steel ingot capacity by nearly 50%. The present capacity is 36,725,000 metric tons, as indicated by the following table:

		Metric Tons
Germany (including Bohemia and Moravia)		25,001,000
Occupied territories:		
Poland	1,554,000	
Netherlands	275,000	
Belgium	2,285,000	
Luxembourg	1,436,000	
France	6,174,000	11,724,000
		36,725,000

Other estimates state that, with the occupation of the greater part of Europe, Germany now controls a steel making capacity in excess of 40 million tons. The output of German controlled Europe (excluding Italy) is said to be somewhat over 2 million tons per month, and it might be expected to reach 2.5 million tons per month. (Germany's apparent steel consumption in the years immediately prior to the war equaled 20 to 22 million tons per year.)

The conclusion seems to be that there is no compelling evidence of the imminence of a dangerous shortage of steel in the German economy.

In the Russian campaign Germany claims that 60% of the Russian iron and steel production has fallen into her hands. The iron ore

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deposits in Krivoi Rog have been estimated at 1200 million tons, having an average iron content of 61%; production in this area amounted to 16 million tons in 1938.

Whereas there may be no problem of the capacity of German industry to produce steel for her war-time needs, there are, nevertheless, two serious bottle-necks in addition to the question of labor. These two bottle-necks are, first, the supply of coking coal, and, secondly, transportation. Some of the countries under German control have ore but little or no coking coal. Belgium, Luxembourg, Scandinavia, Yugoslavia, and Italy are entirely dependent upon importation of coking coal. Hungary is only partially self-sufficient in this respect. Spain, France, and Scandinavia have large deposits of ore, but the question of supplying the steel industries of these countries with ore or coking coal remains a serious one.

c. The Motor Industry.

(1) Rationalization. In 1939 Colonel von Schell, Director of Army Mechanization, was appointed to carry out a complete rationalization program for this industry. The scheme worked out was to take effect January 1, 1940. Motorcycles were included but the restrictions were not as strict as those relating to private cars and commercial vehicles.

The types of private cars in production were to be reduced from about 52 to 30, and of commercial vehicles from 113 to 15. The scheme, which also covered parts, had the particular advantage of reducing servicing and repair problems and of promoting interchangeability of parts.

In the occupied territories, the invading armies were cloely followed by "Kommissars" whose job was to organize the local automotive industry for the most effective utilization by the German Army.

These Kommissars are civilians attached to the automotive branch of the Ministry of Transport, (Verkehrs Ministerium). This Ministry is in direct control of the entire German automotive industry including its dealer organizations, independent garages, etc. The head of the Automotive Industry Branch is General Von Schell. While the organization is purely civilian, it is headed, like many other Government Departments in Germany, by an Army Officer who maintains his rank in the German Army. General Von Schell is to all intents and purposes the dictator of the automotive industry with full power to decide what models a given company may build, what quantities, at what prices they shall sell them, and any other pertinent question. Although not directly connected with the Army in any way, a very close liaison is maintained between General Von Schell's office and the Army General Staff regarding the utilization of the automotive industry in the service of the Army. When the German Armies invaded the low countries and France, General Von Schell's authority was immediately extended to these territories and his staff took over the job of organizing the local automotive plants and other facilities.

On January 16, 1942, Hitler named Jakob Wehrlin as general inspector of automotive transport. He is to receive his instructions

directly from Hitler, and will carry out all inspections in Greater Germany, in the occupied territories, and in the territories of military operations.

(2) Production. The production of passenger cars is reported to have practically ceased, as is indicated in an official German report of the Opel A.G. of 1941 stating that that company would no longer produce passenger cars.

It is estimated that approximately 80 three-ton Blitz trucks are being produced daily at the Opel Plant at Brandenburg near Berlin. Monthly production is estimated at 2,000 units. These are all the military adaption of the standard Blitz Commercial Truck, approximate specifications being 166" wheelbase, 4x2 drive, wood cargo body with troop seats, 85 H.P., six cylinder gasoline engine. This truck is the German equivalent of the Ford and Chevrolet 1½ ton truck in the U.S.A.

The Brandenburg Plant has also been tooled to produce a four-wheel drive three-ton model for use as a cross-country troop and cargo carrier. Production was to start on this job in June, 1941. It is believed that possibly 250 per month of this model are currently being built.

The complete manufacture of the above trucks is carried out at Brandenburg except for sheet metal, rear axle gears, and brake cylinders which are manufactured in the main Opel Plant at Ruesselsheim-am-Main.

The above production figures compare with pre-war production as follows: Passenger car production 10,000 units per month equals 110,000 per year, allowing for inventory time. Truck production, 1,750 per month equals 20,000 per year. Since the Munich meeting of September, 1938, all Opel truck production has been exclusively for the German Army except for small allotments for export.

It has been estimated that the total automotive registrations in Germany as of August, 1939, was 2,000,000 passenger cars. Of these a very small number were actually owned by the Army which in time of war expected to and effectively did requisition privately owned cars for their use. Of these 2,000,000 passenger cars, it is estimated that 45% were in the smallest class with a cylinder displacement up to one liter. These are almost completely useless for military purposes. It is estimated that 30% were in the 1.5 liter class of which ½ might be considered of some military value. Twenty per cent are believed to have been in the 2 to 2.5 liter class; in terms of body space and performance, these would approach the American Ford and Chevrolet. These were the most popular size with the German Army. The remaining 5% are in the over 2.5 liter category and were used only as Staff cars for the higher officers, etc.

Motor vehicle registration in Germany as of January 1, 1941, has been given as 327,000.

Truck production in 1940 is said to have been on a peace-time level. According to a statement by Von Schell, German truck manufacturers were able to deliver during the first year of the war

(September 1939 - August 1940), after satisfying the needs of the army, a total of 37,000 trucks and 31,000 tractors to industrial and commercial enterprises. This number of trucks corresponds to approximately 70% of domestic truck sales in 1938, while the number of tractors even exceeded by about 10,000 those sold in that calendar year.

A Military Attaché report, dated September 1941, states that in the following three months 6,000 generator fuel operated trucks would be placed on the market and in the last quarter of this year (1941) and first quarter of next year (1942) 33,000 trucks operated by gas generator fuel were scheduled to leave the factory.

In 1929 Germany produced 99,500 private cars and 26,100 commercial vehicles, or a total of 121,600. In 1938 she produced 276,592 private cars and 65,577 commercial vehicles, or a total of 342,169. Total sales for January to July 1939 were 215,227; i.e., at the rate of about 370,000 per annum.

The output of motorcycles in 1938 was 314,866 machines, of which 43,000 were exported. Some 1,582,872 machines, or 45% of the estimated world's total of 3,600,000 machines in 1939, were in use in Germany, much the highest percentage of any individual country.

Germany has developed automobile brake linings from a mixture of synthetic rubber bonded with tiny aluminum fibers, the former being a high temperature resisting Buna and the latter tiny wires only 0.03 mm. in diameter.

(3) Exports and Imports. In 1929 Germany exported 4,809 private cars and 2,975 commercial vehicles, or a total of 7,784. In 1938 she exported 65,084 private cars and 13,032 commercial vehicles, or a total of 78,116. In 1939 Germany was exporting at the rate of about 83,000 vehicles per annum.

It was estimated that exports in 1940 were about 10,000 private cars and 5,000 commercial and military vehicles. Oil restrictions, shortage of rubber in occupied Europe, and the adaptation of the industry to the war effort would account for some of the drop in exports.

In 1938 she imported a total of 10,549 vehicles, mainly from Italy and the United States.

Registrations of Buses, Trucks, and Diesel Units

of Continental Europe (Excluding Russia),

as of December 31, 1939.

	BUSES	TRUCKS	DIESEL UNITS	TOTAL
Belgium & Luxemburg	1,570	74,167	1,492	77,229
Bulgaria	573	1,693	231	2,497
Czechoslovakia	1,663	16,397	420	18,480
Denmark	1,742	44,126	132	46,000
Esthonia	222	2,550	115	2,887
Finland	*2,837	*17,706	* 19	*20,562
France	40,000	455,000	18,500	513,500
Germany	14,500	360,000	69,700	444,200
Greece	2,425	5,750	325	8,500
Hungary	700	5,000	-	5,700
Italy	6,300	73,450	43,750	123,500
Latvia	278	3,071	92	3,441
Natherlands	3,200	52,000	2,950	58,150
Norway	3,533	35,118	-	38,651
Poland	2,000	10,000	320	12,320
Portugal	1,590	11,500	430	13,520
Rumania	3,500	5,500	-	9,000
Spain	#5,400	#32,000	#3,900	#41,300
Sweden	4,505	56,853	2,500	63,858
Switzerland	700	15,350	1,850	17,900
Yugoslavia	505	1,673	3,927	6,105
Other Countries	394	3,017	550	3,961
Total Continental Europe Ex. Russia	98,137	1,281,921	151,203	1,531,261

* As of December 31, 1938
\# As of December 31, 1940

d. Machine Production. The machinery industry naturally occupies a key position in the present phase of German economic development. There has been a sharp increase in the use of machinery, not only for defense projects and for raw materials, but especially in agriculture, where the labor situation has been thus greatly relieved. The expansion of railway traffic and other traffic has also resulted in a greater demand for rolling stock and other equipment.

Priorities in raw materials, such as iron have long been established, as is indicated by the introduction of "consumers" and "producer

contingents." Naturally, the greatest beneficiaries of the contingent permits were the industrial and state plants with special tasks to accomplish under the "four-year plan."

In December 1938, a government supervisor for machine production was appointed, with full power to regulate the industry.

From 1933 through 1938 the number of workers employed increased by 158%, and sales increased as much as 204%. Since many of the new workers were untrained, operations of machines were simplified.

The machinery industries were well advanced in the training of apprentices. By the middle of 1938, with a total number of 730,000 workers, there were 85,000 apprentices.

Using 1936 as an index (i.e. 1936 = 100) the number of workers in the German machinery industry rose by June 1939 to 146.0 and the number of working hours to 150.2.

Progress was made in this field in the use of cheaper materials and substitutes. Notable are the use of plastic bearings instead of bronze bearings, with a resultant increase in efficiency of 10-20 times; the use of plastic material for tooth gears; and the extensive use of alloys for parts and machine tools.

The rationalization program evident in every field was also applied early in Germany to machinery. In 1939 the standardization of all types of machinery was making fast headway. Rationalization and reduction of the number of types in the field of building machinery had already been accomplished and was extended to important kinds of meat machinery. One of the prime benefits derived, of course, was the simplification of servicing installed machines.

In May 1941 a new set of regulations was put into effect to regulate the machine tool industry. In effect the government assumed complete control of the industry.

The Skoda works, which were incorporated into the Hermann Goering Works, was one of Germany's most important acquisitions.

The German Ball bearing industry is dominated by two big combines, Vereinigte Kugellager Fabriken (V.K.F.), controlled by the Swedish S.K.F. Co., up to the war, and the Fischer Combine. There are about 8 other companies. The two combines between them probably control 80% of the German capacity.

Taking enemy controlled output into account, the total capacity available to the Germans appears to be as follows:

Country	No. of Works	Estimated Pre-War Output No. per day	%
Germany	16	220,000*	55
Sweden	2	60,000	15
France	4	50,000	12.5
Italy	2	40,000	10
Switzerland	3	20,000	5
Other Countries		10,000	2.5
		400,000	100%

*220,000 per day = 98.2 tons per day or 35,800 tons per annum.

It may be noted that in 1938 Germany exported 2,452 metric tons of ball-bearings and parts, as compared with imports, for the same year, of 1,668 metric tons.

e. Electrical Industry. Some of the wartime developments in the electrical industry include:

(1) The continuation for 1941 of the restrictions on the manufacture of radio tubes (begun January 1, 1939).

(2) Regulations for the production and distribution of electric heaters for air raid shelters and for the price of heating in air raid shelters.

(3) Standardization of trolley buses.

(4) Production of new electric express locomotives.

(5) Production by Siemens of new types of insulated electrical cables for use in the chemical and other industries.

(6) Increased use of aluminum for telephone cables to replace copper.

(7) Standardization of industrial and commercial illumination according to German industrial standards.

f. Electric Power: Capacity, Production, Consumption. Germany is next to the largest producer of electric power in the world.

In the German Power Law of December 13, 1935, Germany was already making plans for the future control and production of the electric power industry. In retrospect the economic and military significance is enhanced.

The law of 1935, in fact, created a nation-wide electric pool formed of the network of transmission lines, comprising all of the principal generating plants of the country, thus making their output available over as wide an area as possible in order to smooth out regional peaks. With this plan it is deemed impossible to put a key factory out of commission by cutting its source of electric power, since the German Minister of Economy can obtain power in any area as long as any is available anywhere in the Reich.

The electric industries play an especially important role in Germany and electric power is vital, particularly to the new electro-chemical and electro-metallurgical works, which figure largely in the production of synthetics. It was expected that these works alone would require current equal to, if not greater than, that of the entire country in 1937. The needs of these plants vary from 4,000 to 40,000 K.W.H. per metric ton of their output.

Between 1933 and 1939 the production of electric power in Germany doubled, and the present production rate is believed to be approaching 80 billion K.W.H., nearly three times that of 1933.

The three major areas of electric power in Germany are as follows: (1) the bituminous coal fields of Western Prussia; (2) the lignite deposits in central and southern Germany and in Saxony; (3) the sources of water power in the mountainous districts of Bavaria and Austria.

The exact amount of electrical power which Germany can draw from the occupied areas is as yet unknown. However, there is evidence of rapid utilization of available sources. A report, dated November 19, 1941, states that, at the beginning of September, a new installation was completed in Belgium for the purpose of furnishing electric power to the industrial region of Cologne.

Other wartime developments include:

(1) The beginning of the construction in Finland by Germany of the second largest power plant in the world, coming only after that of Niagara Falls. It is intended to supply the whole of Finland with electric power.

(2) The appointment by an edict of the Reich Chancellor dated July 29, 1941, and published August 6, 1941, of Reich minister Todt as "Inspector General for Water and Power" (Generalinspektor für Wasser und Energie). Todt's new task is thus defined: "To administer and promote the development of power resources and to plan the power and water economy with due regard to the special requirements of war and to the necessity of uniform planning within the space of Greater Germany." His jurisdiction extends to the new Eastern provinces, while his functions are coordinated to those of other government agencies in the Government Poland, the Protectorate of Bohemia and Moravia, Alsace, Lorraine, Luxembourg, and the reintegrated districts of Lower Styria, Carinthia, and Carniola (?).

(3) The announcement by Todt that water power must be exploited to the utmost, since coal is principally reserved for chemical conversion processes.

(4) Plans for welding the power resources of Europe into one great network, as part of the "New Order."

(5) Plans were underway in 1941 for supplying France with steel from Germany for a big electrification program, including the electrification of railways and the building of hydraulic electric plants which would save some 500,000 tons of coal per year.

Total installed capacity in Germany was 12.42 million kw. in 1929. It has increased steadily from that date and reached 16.25 million kw. in the Altreich in 1938, or 17.3 million kw. in the Altreich and Austria. At the end of 1940 operating capacity in both was certainly over 21 million kw.

The total output fell from 30.66 milliard K.W.H. in 1929 to 23.46 milliard K.W.H. in 1932 and thereafter rose at a steeper rate than installed capacity until 1937, when it was 48.97 billion K.W.H. Total output during 1940 in the Altreich and Austria was probably between 65 and 75 billion K.W.H.

Since 1938 the benefit is being felt of a very large power-station program which was put into effect in 1936-37; and the probability is that the power situation was easier in 1940 than in 1939, was still easier in 1941, and should, by 1942, be relatively satisfactory.

By 1942 Germany should have begun to draw very large power supplies from Austria, where large-scale plans for development began in

1938, and it is possible that, by 1942, the Austrian water power will contribute about 10% of all German consumption.

Germany's imports and exports of power have been small. Imports grew from 595 million K.W.H. in 1932 to 1,231 million in 1937; nearly all came from Austria and Switzerland. Germany might be able to treble her 1937 imports from Switzerland, which were nearly 800 million K.W.H. Exports, about 100 million K.W.H. annually, are of negligible importance.

Since 1937, the tendency has been, for strategic reasons and in keeping with the general decentralization of important industries, to build a larger number of smaller stations up to a maximum size of about 200,000 kw. each.

In 1937 35% of all output in Germany was generated from hard coal and 41% from brown coal. Water power accounted for 14% and gas (from coke ovens) for nearly 8%. Wood and oil provided the remainder. Since 1937 the proportionate importance of brown coal has probably increased, since several large plants were erected in the brown coal fields in and around Saxony.

By far the largest part of German power supplies has been produced in the chief center of population--the Rhineland, Saxony, Bavaria, Westphalia, and Brandenburg.

Great strides have been made since 1938 with super-high tension transmission lines to link up the Austrian water power stations with the industrial areas in Western Germany and the growing industrial concentrations around Berlin and in Saxony. The development since 1938 has largely duplicated, at higher tension, existing communications, so that Germany is in a very strong position as regards the transfer of power from one area to another.

Medium and low tension distribution systems were rationalized as regards transmission voltage, and this standardization is of some note on account of the ensuing simplification of specifications in the manufacture of all kinds of electrical appliances.* The strategic value of this program is obvious.

In 1940 the total consumption of electricity in the Altreich is estimated to have been not less than 63 billion K.W.H., of which industry consumed about 54 billion K.W.H. (about 86%), as compared with 38,429 million K.W.H. consumed by industry in 1937. Household use and handicrafts accounted for about 8.3%, electric traction 4.1%, agriculture 1.2%, and public lighting 0.4% of the total consumption.

It has already been said that there appears to have been a serious power shortage in Germany in the years 1938-40, but that the situation can be expected to become easier from now on owing to the great increase in generating capacity which is taking place. In spite of this, there remain areas where power is noticeably short. These areas are, for the most part, on the boundaries of the Altreich. In western Germany some help can be expected from the Dutch and Belgian colliery plants, which are mostly near the German frontier; from the numerous Belgian plants around Liège, which have coal supplies near at hand; and from water power plants

* See also Machine Production.

along the Rhine. These are known to have been connected (or to be in course of connection) with the German system since the collapse of France and the Low Countries. More power could, if necessary, be drawn from the plants on the Upper Rhine, some of which are owned jointly by German and Swiss interests, others being entirely Swiss. In eastern Germany, where transference of vital industries from the west may be causing a temporary power shortage, little or no help can be obtained from the occupied countries within a number of years. Both Poland and Czechoslovakia produced electricity in quantities corresponding to their requirements and are more likely to require assistance from Germany if their industrial activities are being accelerated. Not until the water power developments in eastern and southern Austria are complete--say about 1944--will Germany be able to dispose of a real surplus of electrical energy in her eastern territories.

The recent establishment of the "Ost Energie A. G." (Eastern Power Inc.) as a subsidiary of the "Werke des Generalgouvernments A. G." (Works of the General Government Poland) is reported by the "Elektrizitaetswirtschaft" (Electric Power Economics), the official organ of the National Power Plants Union, No. 27/1941. The purpose of the newly established company is to purchase, erect and operate plants and equipment in the electric power production field within the General Government Poland. The formation of the "Ost Energie A. G." is interpreted as reflecting a strict coordination of power production and a strictly centralized production policy applied by Germany in the "General Government Poland".

g. Chemicals and Allied Industries. Like all other industries, the German chemical industry has seen tremendous expansion and drastic changes in recent years. The latest developments have naturally pointed toward the war effort. Typical has been the rationalization so evident in every branch of Germany's industrial efforts. In the following pages the more significant aspects have been analyzed.

The occupation of Poland gave Germany valuable additions to her chemical industry, particularly such products as explosives, ammunition, and nitrogen compounds, turned out in the Sandomierz district. At the end of 1937 there were already 992 chemical factories in Poland employing 63,000 workers.

Reich chemical and allied industries, employing over 600,000 persons, have experienced a new boom since the outbreak of the war. Production had reached a new peak in 1939. At the outbreak of the war the publication of all statistical data was discontinued for military reasons. It is known, however, that the output receded in such lines as dyes, paints and pigments, soaps and other consumer goods, while it increased greatly in industrial chemicals required for producing domestic substitute or alternate materials or for the manufacture of munitions and other military needs. Marked gains are reported, for example, in the manufacture of sulphuric, nitric, acetic, and other industrial acids, alkalies, electrochemical products, carbon bisulphide, coal-tar derivatives, and related materials. An indication of the extent of further production increases since the war started may be taken from the recently published report of the German A.G. Dynamit Nobel, manufacturer of explosives, celluloid, plastics,

etc., which announced that in 1940 production had been 50 percent higher than in 1939.

Germany's leading chemical exports normally are coal-tar, dyes, potash, medicinals, ammonium sulphate, nitrogenous fertilizers, pigments, paints and varnishes, synthetic resins, insecticides, and other agricultural and industrial chemicals.

In certain chemicals the Reich is the world's chief producer. Of the 1939 world output of approximately 200,000 metric tons of dyestuffs, Germany accounted for the largest share, exporting about one-third of its production and supplying 56 percent of the total international trade in these products. In normal years the Reich exports 50 percent and more of its dye output.

German financial penetration in France was revealed with the announcement in December 1941 that I.G. Farben has obtained control of three leading French concerns, Kuhlmann, National Coloring Matters and Chemical Products Co., Ltd., of St. Denis, and French Chemical Products Co. of St. Clair du Rhone.

(1) Nitrogen. As the world's largest nitrogen producer Germany was credited with a total installed productive capacity of about 1,300,000 metric tons of nitrogen in 1934. Domestic consumption and military requirements have increased steadily in recent years.

Of the world's 3 million metric ton output of nitrogen in 1938-9, German synthetic ammonia plants with a capacity of 1.4 to 1.5 million tons supplies the largest share. Most of the Reich's production of synthetic ammonia is from brown coal water-gas and is manufactured in I.G. plants at Leuna and Oppau near Ludwigshafen.

The fertilizer-nitrogen consumption in 1938-39 rose to 718,000 metric tons from 634,000 in 1937-38, and 383,000 tons in 1933-34.

Purchasing and sales quotas are under strict control of the Reich Chemical Board. Consumption of nitrogenous fertilizers in Germany (old Reich) for 1940-41 was to be restricted to 85% of the quota for 1938-39 (except for Austria and Sudetenland, where the percentage is higher).

In 1940 an important nitrogen plant was constructed at Linz, Austria, primarily to satisfy Austria's domestic requirements. The acquisition of large plants in western Poland and Norway enlarged Germany's nitrogen productive capacity.

(2) Glycerine. It was expected that new and old processes together would cover all of Germany's increased demands for glycerine. In 1937-38 Germany exported glycerine to Peru and imported a small amount from Argentina. There have been reports of a substitute for glycerine.

(3) Gas. Exports of compressed gas increased from 4,355 metric tons in 1931 to 21,923 in 1938, and 11,832 for the first five months of 1939. There were marked gains in production of compressed gas, especially acetylene and oxygen, and evidence of plant enlargements.

Official statistics, which are rare, state that the output of sulpher-dioxide grew from 5,927 metric tons in 1933 to 17,041 in 1937.

(4) Copper Sulphate. Widely used as a fungicide, copper sulphate was consumed in Germany normally at the rate of 15 to 20 thousand tons annually (representing 4 to 5 thousand tons copper). It was the only

insecticide for which it was necessary to have a ration card. Arrangements were made to remove about 9,000 tons from France to Germany. Severe restrictions on its use in Italy and France indicate that this may be a difficult problem for Germany and the occupied territories, even with the substitution of iron sulphate and arsenical sulphates.

An order of the Reich Chemical Board made effective 4-9-40 restricted the purchase and sale of cuprous insecticides to percentage quotas, based on respective purchases and sales in 1939.

(5) Sulfuric acid. Two-thirds of Germany's sulfuric acid was obtained from imported materials, mainly pyrites, supplied chiefly by Spain and in smaller amounts by Norway, Cypress, and Italy.

There is every indication that Germany's efforts to produce sulfuric acid from gypsum have been successful. The process requires coke and clay, and Germany has an abundance of all three.

Current production is 2,800,000 tons annually, with over 60 plants in operation, and from a military view point this is highly important, since sulfuric acid is required for fertilizer manufacture, for the production of synthetic raw materials such as artificial fibers, buna rubber, plastics, motor fuels, and for munitions.

The process of producing acid from gypsum was first developed in the World War (#1)

(6) Sulfur. Sulfur used to be obtained from the United States and Italy, but is now produced from coke oven gases, and more especially waste gases produced by synthetic gasoline plants, so that now Germany is able to supply the bulk of its sulfur requirements from domestic sources.

Headway was reported in the production of elemental sulphur from gases of hydrogenation and coke oven plants. In 1937 output was estimated at 70,000 metric tons of elemental sulphur against requirements of 110,000 tons; for 1939 it was planned to produce 100,000 tons and over 180,000 tons in 1940.

(7) Phosphate Fertilizers. With an insufficient domestic production of basic phosphate slag, Germany was largely dependent upon foreign sources, imported chiefly in the form of phosphate rock.

Alsace Lorraine is expected to alleviate Germany's deficiency in phosphates, and recent reports indicate that the Axis is getting considerable quantities of phosphate rock from Tunisia and Algeria.

One of the German-Finnish objectives in the present campaign may very well be the control of Kirovsk (formerly Kibinogorsk) on the Kola peninsula, considered the world's largest producer of apatite, which, with recent development, reached in 1938 a figure of 2,000,000 tons per year.

A notice of the Reichstelle Chemie of September 12, 1939, restricted the purchase and sale of phosphatic fertilizers for the year ending April 30, 1940, to 40% of the preceding year, and for the year ending April 30, 1941, a further restriction, limiting purchases and sales to 25% of the preceding year, became effective.

(8) Potash. The potash industry has been reorganized in recent years, resulting in a systematic simplification of its corporate structure and a broadening of interests of the producing companies to new industrial spheres distinct from potash.

For example, the Salzdetfurth A.G. which controls more than 25% of the national potash output, has now only one-third of its interest in potash, one-third in copper, and one-third in lignite.

Winterschall A.G. which controls more than 40% of the potash output is now producing motor fuels and specialty manufactures.

Germany's consumption of potash fertilizer rose from 718,000 tons K_2O in 1933-34 to 957,000 in 1936-37, and 1,156,000 tons in 1937-38. Official statistics for 1939 are lacking.

Germany is also the world's largest producer and exporter of potash, having strengthened its monopoly still further through recent incorporation of 11 Alsatian potash mines. In 1937 Germany produced 62 percent and France 15 percent of the world's potash.

(9) Soap. Germany's normal consumption of technical fats is estimated to be between 350,000 and 400,000 metric tons per annum, of which between 60 and 70% goes into the manufacture of soaps, the next largest consumer being the paint industry which accounts for about 17% of the total.

Germany is reported to be producing large quantities of synthetic fatty acids from paraffin hydrocarbons, with the expectation of reaching from 30 to 40 thousand metric tons, and with plans for further expansion.

Soap is, of course, rationed. Like everything else, soaps have been standardized in size and composition. A substitute known as Einheitsseife, containing only 40% fat was exhibited at the Leipzig annual fair and placed on the market. Kaolin is used as a filler, and Germany as well as Czechoslovakia has extensive deposits. Production in both of these countries has risen steadily.

(10) Quinine. It is believed that German Europe suffers from a shortage of quinine, which is of particular importance in the African and Middle East areas. Total stocks in German Europe in May 1940 were about 275 tons of actual or extractable quinine salts. Pre-war requirements of the German hegemony were about 210 tons per annum if the needs of French North Africa are considered, or 190 tons if they are not. On this basis there was enough quinine in German Europe to supply domestic needs for about 17 months from May 1940.

Before the war, however, Germany was the leading producer of synthetic anti-malarials, although these substitutes are considered definitely inferior.

(11) Oils. Candles are now made with paraffin mixed with hard wax instead of with stearin and beeswax. Like everything else, the production of candles has been officially standardized and only 14 types of candles will be produced instead of 64 as heretofore.

Germany produces only about 5% of its domestic requirements of linseed oil. Out of the 150,900 metric tons crushed in 1938 in Germany, only 7,000 were locally produced. Because of this, synthetic paint materials have been widely used. (One of the substitutes mentioned is called El-Firnis.)

Citronella oil imports from Ceylon were:

1937	1938	1939
158,673 pounds	141,415 pounds	90,109 pounds

Lemon oil imports from Italy:

1937	1938	7 mos. 1939
41,681 kilograms	48,390 kilograms	28,089 kilograms

1,574,000 pounds of castor beans were imported from Brazil in 1939.

In 1939 Germany imported 4,738 kilograms of Siamese gum benjamin from Thailand.

In 1938 Germany exported 212,984 kilograms of beeswax to Chili (about the same amount as in 1936-37).

Germany imported Pettigrain oil from Paraguay in recent years. She also exported cosmetics and essential oils to El Salvador and to the United States.

For petroleum jelly a substitute was found in a new synthetic fat.

(12) Paint and Varnish. This industry suffered from a lack of raw materials, since Germany had a marked dependence on foreign sources for drying oils, gums, and pigments. Synthetic materials have been developed and among the more notable wartime achievements have been the use of flame-proofing agents for roofs and fireproof paints against incendiary bombs, and luminous paints for blackout buttons, traffic signs, advertising articles, and jewelry.

(13) Plastics. Germany has been very active in the production and application of plastics. It should be noted here that plastics are now extensively used for industrial purposes as well as for household and other accessories. Among the industrial uses for plastics may be mentioned machine bearings, transmission belts, metals, paints, and lacquers. By 1940 plastics were molded in about 1500 plants, and an apprentice workshop, said to be the first of its kind, was established at Halle.

(14) Glass. Germany, always one of the leading countries in the glass industry, was reported in 1941 to be planning collaboration with France in the field of optics and fine mechanics.

The current rate of production of optical glass is estimated at not more than 600 tons per annum, of which Germany with three producers accounts for 500 tons and France with one producer for 100 tons.

(15) Arsenic. In 1939 the total exports of arsenic to Germany was less than 73 metric tons for agricultural use, but it is reported at the end of 1940 that Sweden had shipped 1,000 metric tons of pure arsenic to Germany, and that the latter was endeavoring to procure even more.

(16) Borax. Germany produces virtually no borax, but consumes about 8,000 long tons annually. Italy and Turkey could supply her with about 60% of her needs.

Since the middle of 1939 there have been in force restrictions on the use of borax in virtually every other field except technical and optical glass.

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(17) Dyes. Indications are that dye production expanded in 1939 after a substantial decrease in 1938. Germany was the leading exporter of dye-stuffs, being credited with supplying 56% of the total international trade in these products.

In 1931 Germany exported 47,359 metric tons of dyes and intermediates. By 1933 her exports had dropped to 29,886 metric tons, and rose again steadily until 1937 when it reached 43,486 metric tons. In 1938 the exports totaled 32,863 metric tons. The first seven months of 1939 show a figure of 23,902 metric tons compared with 17,413 metric tons for the corresponding 7 months of 1938.

Up to the beginning of the war Germany was able to supply India with 8,511,211 pounds in 1939, compared with 7,754,663 pounds in 1938; 44,401 pounds to the Union of South Africa; 634,706 pounds to Canada (compared with 1,020,865 in 1938); and 64% of the dyes necessary for Netherland's textile industry (compared with 60% in 1938 and 77% in 1929).

A development of great significance in November - December, 1941 was the official announcement that the I. G. Farbenindustrie had acquired 51% of the stock in the New French dyestuff and chemical company, Francolor. Farbenindustrie will give technical advice and certain raw materials to the French Company, and in return will benefit through the exclusive use of French patents.

(18) Casein. Germany's supply of casein has been lessened due to the war. However, her output has recorded a marked expansion from 220 metric tons in 1932 to 10,000 tons in 1938 (about 55% of her consumption), and further gains were expected. Until 1939 at least, Germany was still importing casein from Argentina.

(19) Explosives. It is probable that Germany has no difficulty in obtaining adequate supplies of explosives. It may be noted, however, that she is making some use of existing French plants, particularly for nitro-glycerine and TNT. The maximum annual output Germany can get from the factories which she is utilizing in Occupied France is 4,000 tons of TNT (5% of German domestic production) and 2,000 tons of nitro-glycerine (25% of German domestic ordnance production).

(20) Alcohol. The potential production of alcohol in 1942, in German controlled Europe, is estimated at 2,500,000 tons. 25% of this could be produced from sugar beet, provided that a cut of 25% were to be made in the edible sugar allocation in Germany, Italy, and Czechoslovakia.

Potato distillation has been curtailed for 1942 to 75% of the basic contingent.

Also, beginning January 1, 1942, only one-tenth of the former 8,000 distillers were licensed to operate.

h. Rubber and Buna. Germany produces no natural rubber but has developed an excellent substitute, "Buna," the production of which is now estimated at some 63,000 tons annually. Reports from the Continental Rubber Works at Hannover show a continued expansion in Buna production, and a tentative goal of 72,000 tons is probably now in sight.

Up to 1941, at least, the synthetic rubber output has been

concentrated in two works, namely: The Chemische Werke Hüls near Recklinghausen, and the Buna-Werke at Schkopau, near Merseburg.*

Although the two factories referred to are the main producers of Buna, another synthetic rubber product called THIOKOL has been produced since 1938 at SAARAU in Silesia by the THIOKOL G.m.b.H. This factory made Buna for washers, oil tubes, and other articles, and may very well be playing an important role in Germany's plans for Buna expansion.

The German tire industry had attained sufficiency in the production of materials necessary for tire manufacture.

Cotton - replaced by cell-wool.
Sulphur - available in adequate quantities.
Carbon-black - produced from naphthalene
Zinc - recovered from ashes and slag for zinc oxide.

Two recent innovations in the manufacture of tires are reported in Germany. Alfred Spencker has patented (DRP 689 959) a new soft rubber air-cooled solid tire for trucks of two and one half tons. The new tire effects a saving of 10 to 15 kilograms of rubber per tire, and the innovation is a floating air suction head at the hub of the wheel which leads cooling air through radial channels to the periphery of the tire tread. Tested at speeds of 120 kilometers per hour the inner and outer temperature of this puncture-proof tire was claimed to be lower than that of any pneumatic tire.

The other new development is a steel cord instead of a textile cord for pneumatic turck tires. Fine strands of wire are placed in layers at 45 degree angles like normal textile cords, except that the wires are placed farther apart than the threads. The added weight of the steel wire in the carcass is offset by the fact that where normal truck tires require 12 to 14 plies of cotton, only 4 plies of steel wire are necessary. The steel cord type tires are claimed to be satisfactory in operation although the average tire temperature is somewhat higher than for cotton cord tires, and it is planned to start turning them out soon in mass production.

It has been reported that the Hungarian Government Chemical Works, Peti-Nitrogen, will begin production of Buna by late spring of 1942.

The great strides in this synthetic rubber production may be seen in the following estimates:

1934 -	10 tons or less
1935 -	100 "
1936 -	1,500 "
1937 -	4,000 "
1938 -	10,000 "
1939 -	25,000 "
1940 -	60,000 "
1941 -	60 - 70,000 "
1942 -	80 - 90,000 "

* See Appendix B for location.

Imports of natural rubber reveal that Germany has been accumulating a stock-pile in recent years. Import statistics are as follows:

1922-26 - 24,980 long tons annual average
1927-31 - 42,200 " " " "
1932-36 - 58,630 " " " "

1933 - 54,120 tons
1934 - 59,330 "
1935 - 62,899 "
1936 - 71,794 "
1937 - 98,200 " to 122,000
1938 - 90,200 " to 95400
1939 - 57,692 " to 59,600 (7 months)

Imports of scrap rubber rose to a high figure of 40,000 tons in 1937, then dropped in 1938 to 16,000, which may indicate that Germany felt her stocks to be adequate.

It is believed that large stocks of rubber were seized in the campaigns of 1940, especially in France, where 225,000 tons were reported confiscated. There has been no further corroboration of this figure, however. Conversations with reliable American experts tend to regard the estimate as too high, and suggest that, actually, only some 60,000 tons were taken as booty. The subject is being given further study, for, if the 225,000 tons referred to are accurate, Germany's position with regard to rubber would seem to be secure for some time. After the collapse of France, the Germans carried out wholesale requisitioning of rubber products from the principal producers there, namely Goodrich, Michelin, and Dunlop. In 1941 the tire and tube companies in France were said to be operating at about 30% of the pre-war output.

The rapid strides in Buna production, and in reclaiming rubber may not, however, have kept pace with Germany's war-time needs. It has been calculated that 143,000 tons of rubber, natural and synthetic, were available per annum, and that Germany was using this commodity (during December 1941) at the rate of 203,000 tons per annum.* Nevertheless, there was no evidence to suggest marked loss inefficiency of the military effort due to lack of rubber, in spite of this apparent heavy deficiency. It has been estimated that the rubber requirement for tanks and other A.F.V. amounts to 1,708 tons per month.

It is highly probable that a serious shortage of rubber exists in the German controlled countries, since consumption there was some 300,000 tons in 1938, as compared with supplies of only 125,000 tons from all sources in 1941.

Strict rationing, and the almost complete exclusion of private vehicles has made more rubber available for war purposes. It may be noted, too, that as far back as 1937 automobile tires were standardized, and the

* This figure of rubber consumption is believed by some American experts to be excessive.

number of types reduced from 37 to only 10.

According to the "Gummi Zeitung," Buna can now be used successfully for making dipped goods such as seamless gloves, nipples, etc. However, for thinner dipped goods like surgeons' gloves, where strength, thinness, and elasticity are essential, natural rubber must still be largely used. It has been found that balloons for children and advertising can also be made satisfactorily of Buna, but production of this item has been prohibited until after the war.

Gaskets of Buna are replacing gaskets of asbestos, which has to be imported. Since Buna resists heat and oils and stiffens rather than softens at high temperatures, it is claimed to be quite satisfactory. To make the gaskets, three sheets of synthetic rubber are sandwiched with two layers of steel wire netting, which are placed at 45 degree angles to each other. Buna gaskets are reported to have better holding properties than the usual gaskets and can resist hot water and hot oil up to 350 degrees and can resist glycol, regular gasoline, and leaded gasoline.

(1) Calcium Carbide. (Used now principally in synthetic rubber, resins, fibers and solvents.) It is estimated that the national output as early as 1938 was about 1,000,000 metric tons, compared with 600,000 in 1934, and 275,000 in 1929.

(2) Carbon Black. While popular interest has been focussed on German "ersatz" materials for rubber and cotton, scant attention has been paid to the fact that German industry has been independent of American carbon black shipments since the beginning of the present war. Germany apparently began preparing for this self-sufficiency before 1922 since the first German reports concerning attempts to manufacture blacks similar in quality to the American blacks appeared in that year. Numerous applications for German patents were made, and some practical as well as theoretical successes were realized.

Germany, however, remained one of the best customers of American carbon black until the outbreak of the war. Statistics also reveal the interesting fact that Germany accumulated stocks of carbon black in 1937, 1938, and 1939 (until September).

It is believed that German carbon black requirements amounted to approximately 16,000,000 pounds a year. Thus the German import figures would indicate that Germany had a little more than a year's supply at the start of the war. But even though these reserves were augmented by supplies of American carbon black captured by the Nazis in Czechoslovakia, France, and other occupied countries it is probable that they have been consumed by now and that Europe today depends on gas blacks produced from solid and liquid hydrocarbons in Germany and probably in Czechoslovakia and Poland.

i. Textiles. In the textile trade the rate of operation varied considerably according to the different branches of industry and the extent to which individual enterprises were allocated raw materials seized in the Netherlands, Belgium and France. On the whole, the curtailment of work was highest in the wool industry, for which imports were drastically reduced by the blockade. Cotton mills were in a slightly better position

owing to the extensive use of staple fiber and to the importation of limited quantities of cotton from Soviet Russia and from several Asiatic countries including Afghanistan and Iran via Russia. Reports from the trade indicate, however, that supplies of raw materials obtained by requisitioning in occupied territories were nearing exhaustion at the beginning of 1941. Thus, the temporary revival in certain branches of the textile industry in the latter part of 1940 due to requisitioning will cease in the current year.

A general trend in the production programs of textile mills, often referred to in trade publications and about which many complaints have been heard in consumer circles, is the shift from cheaper and coarser articles to finer and more expensive fabrics. The possibility of obtaining a higher output value with the limited quantities of raw materials at their disposal was the main consideration which guided manufacturers in adopting this policy.

These complaints have of late attracted the attention of the Reich Price Control Commissioner who has broadcast a warning to the effect that if manufacturers do not change this policy and bring on the market goods of various classes approximately in the same assortment as before the war, he would be forced to intervene by regulating their production programs and eventually consider the question of introducing definite standards for textile and other consumer goods.

The clothing industry was working for the army to the extent of about one-half of its capacity toward the end of 1940 and was covering about 80% of the army's requirements, while the remaining 20% was supplied by the army's own tailoring workshops.

(1) Textile Fibers. Before the war (1937) the Reich's consumption of all kinds of fibers was estimated at 969,000 tons. New and reclaimed domestic fibers accounted for 29% of the total in 1937 as against 25% in 1936 and 13% in 1932. In 1937 imports of cotton totaled 362,000 metric tons; wool, 64,000 tons; jute, 109,000 tons; flax, 29,000 tons; and hemp, 120,000 tons.

Available statistical data for the years 1939 and 1940 are incomplete and therefore it is impossible to estimate German textile fiber consumption during the war. The situation is, however, dominated by the following factors: (1) a considerable reduction in textile requirements for civilians under the "clothing card" system, (2) a sharp increase in the production of staple fiber (Zellwolle) and rayon, (3) a greater use of reclaimed materials, especially shoddy, and (4) the importation of certain quantities of cotton from Russia and some of the Asiatic countries via Russia, of flax from Russia* and of hemp from Italy and Yugoslavia.

The progress made in the production of staple fiber as a "universal" substitute for cotton, wool, and lately, jute is indicated

* Up to July, 1941.

by the following table:

Years	Metric Tons
1923	2,000
1935	15,600
1936	45,000
1937	102,000
1938	154,000
1939	192,000

Owing to the completion of a number of new Zellwolle plants and to the expansion of old ones, German sources estimate the 1940 output at 300,000 to 325,000 metric tons. This latter figure represents about three-fifths of the annual pre-war imports of cotton, wool, and jute.

Rayon production has grown during the past few years by approximately the same proportion, having risen from 28,000 metric tons in 1932 to 80,000 tons in 1939, while the 1940 output is estimated by the same German source at 100,000 tons.

Among the outstanding developments in the German synthetic fiber industry, which have opened up new uses for this material, is the production of Zelljute, intended to serve as a substitute for jute, and of Zellgarn which is used in the manufacture of a new binder twine.

It is claimed that Zelljute, although it does not equal natural jute in regard to tensile strength, is superior to burlap in that it is more uniform, elastic, and durable. Large-scale production is expected to begin in 1941 in a plant having an annual capacity of 20,000 metric tons.

The new Zellgarn, a product of an entirely new spinning method, is claimed to be of great importance to agriculture, which has suffered greatly from the cessation of imports of sisal. The "extreme urgency" of developing a substitute for binder twine in time for the 1941 harvest prompted the competent authorities to take extraordinary measures. After the new synthetic twine had been tried out during the first six months of the war, orders for the construction of a plant in Lodz (present Litzmannstadt) were placed in May 1940 and work was completed in what is claimed to be a record time of seven months so that operation was actually started in December, 1940.

Special efforts have been made by the German government since 1932 to promote the production of animal and vegetable fibers. The output of washed wool has risen from about 5,000 metric tons in 1932 to approximately 10,000 metric tons in 1940. Flax production--for which only acreage figures are published--has increased sharply, the plantings of flax having risen from around 5,000 hectares in 1932 to 100,000 hectares in 1940. Similarly, the area planted for hemp has risen from 230 hectares to over 20,000 hectares during the same period and a further expansion is planned.

(2) Collection of Textile Waste. In order to increase the supplies of textile raw materials, a nation-wide campaign for the collection

of all kinds of worn-out clothes, old rugs and other waste materials was proclaimed on July 25 by the Reich Commissioner for the Utilization of Waste Materials. Many garments and other textile goods which had been completely worn out and which were therefore considered useless by German housewives will now be reclaimed and returned to productive use, the Commissioner stated in his appeal to the public.

German press comments repudiate in advance all attempts at interpreting this measure as an indication of growing shortage of textile raw materials which might have been accentuated by the cessation of cotton and flax imports from Soviet Russia. It will be recalled, however, that a similar campaign for the collection of copper, tin and other non-ferrous metals with a view of building up a "national metal reserve" was launched in the fall of 1939 after the termination of the Polish campaign. The present German campaign for the collection of textile waste also happens to coincide with the difficulties which holders of "clothing cards" are experiencing in covering their legitimate requirements for certain textile goods and with reports that the scope and quantity of textile goods which may be purchased under the third clothing card to be issued in September or October next will be further restricted.

The necessity for making a special collection of textile waste, which will be carried out by the local organizations of the National-Socialist Party, is due to the fact that the usual house to house collection of rags by junk dealers has become impossible during the war since many of these dealers have been called to the colors or have shifted to more profitable occupations.

It is recalled in this connection that some 140,000 tons of cotton and wool, valued at over 30,000,000 reichsmarks, were reclaimed from textile waste in the year 1937.

Another indication of the growing shortage of textile raw materials, especially of hemp and jute, may be found in the rapid expansion of the paper yarn industry which manufactures yarn from cellulose-paper and mixed yarns from cellulose-paper and natural textile fibers. From 80 to 90 factories were reported to be engaged by the middle of 1941 in this line of production which also played a conspicuous part in German textile production toward the end of the last World War.

On the surface, at least, the situation regarding textiles seems to become more serious. The new Reich Clothing Card, valid from 9-1-41 to 12-31-42 (sixteen months) has a point value of 120*, compared with 150 for the previous twelve-month period (9-1-40 to 9-1-41). It is also admitted that the cotton situation is serious.

Nevertheless, this purported serious condition seems to be contradicted by the "facts." If it is true, as reported in one German publication, that stocks of every type of clothing were 8% higher

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* To get some idea of the meaning of the "point" system, it may be noted that a man's suit costs about 80 points, and a woman's woolen dress 42 points; also that a certain number of points are made available at intervals.

in July 1941 than in July 1940, and that the quantity of textile materials of every description during June and July 1941, was 30% greater than for the same months in 1940, it seems more probable that the answer lies in (1) the problem of transportation, (2) the lack of skilled labor, and (3) the military requirements, as, for example, the special equipment for the tropical service of the German Africa Corps.

That the textile situation is by no means satisfactory can be seen by the fact that in December, 1941, Goebbels was placed in charge of an intensive drive for woolen, fur, and winter materials (Woll-, Pelz-und Wintersachen-Sammlung).

The results of the campaign were announced in Goebbel's radio address of January 14, 1942. Altogether 67,232,686 articles were collected, including skis, and 4,000,000 furs.

j. Hides. Domestic production of hides and skins is 60% of old Germany's industrial needs, and there is little chance of a livestock increase sufficient to make up the remainder. Synthetic leather from the whale industry is said to be excellent, but this source of supply could be cut off in time of war. Greater use of substitutes, better veterinary hygiene, and increasing protection of cattle against spoilage of skins help conserve the supply. Imports of hides and skins (exclusive of net imports of 2,613 tons of furs) in 1937 amounted to 154,919 tons, while imports for Austria were 759 tons and for Czechoslovakia 32,718 tons. Though Czechoslovakia is one of the leading leather products exporting nations, her domestic hide production is adequate only for home consumption. The 1937 leather net imports were: Germany 4,835 tons and Austria 112 tons, while Czechoslovakia had a net export of 1,035 tons.

As compared to the period before the war, the leather industry has suffered a greater contraction in output than the shoe trade. The main explanation for this is that the rate of operation of the leather industry was largely dependent on the supplies of imported hides from oversea countries. The possibilities of shifting over to other materials were limited and were mainly confined to the working of pig and fish skins which assumed greater proportions in the course of 1940. On the other hand, the materials increasingly used as substitute for leather were manufactured either by the chemical and rubber industries or by the shoe factories themselves (utilization of leather offal).

Production programs in the shoe industry were entirely determined by the requirements of the army and of the workers employed in the essential industries. Shoes for children were also accorded perferential treatment in production as well as in distribution. Many factories are reported to have taken up the manufacture of workers' and children's footwear in order to keep their plants going. The famous Bata shoe factories in Czechoslovakia are said to have adapted their production program to the supply of workers' shoes for the Reich.

The manufacture of composition leather (Lederfaserwerkstoff)--which consists of reclaimed fibers from waste leather, a binder, and filling materials--occupied a prominent part in Germany's wartime

production of leather substitutes, and more than fifty firms were engaged in the manufacture of this material toward the end of 1940.

The main substitutes for leather which gained prominence in the course of 1940 were wood and buna (synthetic rubber) for soles and fish hides for uppers. In the summer of 1940 the shoe industry and retail trade experienced a regular boom through the sale of ladies' light shoes with wooden soles which could be purchased without permits. Also, the allocation of larger quantities of buna to the shoe trade, as a result of the expanding production of this material, led to its increased use as sole material for new shoes, especially for workers' footwear. From the beginning of 1941, all resoling will have to be done with buna.

A recent report states that Germany will get 70% of the entire French production. There are also indications that Germany is running leather through the blockade from Brazil.

With regard to leather, it may be concluded that Germany is probably hard-put to meet all of her requirements. In recent months there have been attempts to call in additional leather goods, particularly old boots and shoes, from the public.

k. Timber. On an area only two-thirds the size of that burned by forest fires annually in the United States, Germany proper has depended for her entire domestic supply. She, therefore, has done her utmost to increase her home production of timber in order to cover the greatly increased industrial requirements. The first measure in this direction was recourse to those inland timbers which previously have been used as firewood in spite of the possibility of working them up into industrial materials, such as wood pulp. Now only that wood can be used as firewood which cannot be employed in the paper, cardboard, staple fiber, or cellulose industries. The second measure adopted to improve the yield of timber applies to that section of forest which has hitherto lagged behind the state and large private forests, i.e., small forests and woods. One-third of the total forest area is in the hands of small owners; however, they delivered on the average but one-fifth of the wood delivered by the state and large forests per acre of forest land. In addition to expert advice given small owners, special officers have been entrusted with tending of such forests, and all the necessary steps have been taken to ensure skilful treatment and improvement of the timber yield, as well as to ensure an even distribution of removals. A decree of February 10, 1939 orders use of timber-saving methods for building construction, as the industries have increased their demands so tremendously that 20 to 25% of the required timber has had to be imported. Wood is now being used as raw material for new products such as sugar and other chemical industry items, or for textiles, fiber in tires, drive belts, etc., which formerly were made of other raw materials. As a consequence, the removals, normally about 41,000,000 cubic meters per year, in 1935 jumped to 50,000,000 cubic meters and in 1938 to 59,550,000 cubic meters. This is about 159% of the annual growth, and since continuation threatens the forests with devastation, Marshal Goering in his capacity

as Reich's Forest Master issued a decree on October 1, 1938 reducing the cutting to the 1937 level of 56,070,000 cubic meters or 151%. In 1938 the consumption reached a record high of 67.45 million cubic meters compared with 65.09 for 1937 and 58.18 for 1927.

This does not include Austria nor Czechoslovakia. Both have extensive forests and well developed timber industry. Those of Austria cover more than a third of the country and have an annual growth of about 9,000,000 cubic meters--1,100,000 cubic meters more than Germany's 1938 net imports. About 9.5 million cubic meters are being cut, but in the near future there will be no material surplus for Germany, who heretofore has absorbed about 60% of Austria's exports. The construction projects initiated by Germany in that area after annexation will absorb 7,000,000 cubic meters and the remainder is required for Austria's long-term export obligations to Italy, Hungary, and Switzerland. The eventual surplus, however, is estimated at 2,000,000 cubic meters. Cut during 1938 was increased to about one and a half times that of 1937.

State-owned forest lands in Czechoslovakia comprise about 2,470,000 acres, or an estimated total of 11,362,000 acres, and finished and unfinished lumber products formed one of the chief items of export. Half of the Ruthenian area lost to Hungary in the fall of 1938 and spring of 1939 was covered by forests and had a thriving lumber industry. As its production was included in the total for Czechoslovakia, the exact loss is unknown. Exports in 1937 totaled 1,197,000 tons (1,422,754 cubic meters) valued at ₰17,668,000. Felling restrictions in force for many years have built up a considerable reserve of mature timber. In view of the extensive road construction program and the higher requirements of the Reich market, a decree effective May 17, 1939, obligates timber land owners to increase their cut for the farm year ending October 1, 1939, to 150% of the normal output of soft wood. As wood was used primarily for fuel in some regions, especially the Sudetenland, German coal is being substituted to cut consumption in favor of the synthetic industries. Greater Germany now has sufficient timber for war purposes and has become the most important timber producing nation in Europe.

(1) Improved Timber Situation. The fact that the southeastern, Scandinavian, and Baltic countries with large forest resources have been cut off by military operations from the west-European markets which formerly absorbed a large part of their timber surplus and have been forced, therefore, to sell larger quantities of timber and wood products to Germany, was reflected in a general improvement of the Reich's timber situation, permitting a reduction in the felling of timber in Germany.

Official sources estimate the Reich's imports of wood during the forestry year ending September 30, 1940 at 14,000,000 cubic meters, compared with an annual average of about 9,000,000 cubic meters during the last years before the war. It is expected that about 12,000,000 cubic meters will be imported during the forestry year 1940-41. It is also claimed that as a result of higher imports during the last year, the German stocks of both props and pulp wood are higher than at the outbreak of the war.

This situation is believed to account for the reduction of felling quotas for certain kinds and grades of wood by an order of the Reich Wood Board (Reichsstelle für Holz) of September 28, 1940, governing the felling and the distribution of wood in the new forestry year beginning October 1, 1940. Also the sale of small quantities of wood has been released from rigid control measures.

1. Substitute Materials. In her struggle for self-sufficiency, Germany has resorted for a number of years to the use of "Ersatz" or substitute materials. This applies, of course, both to the finished products and to raw materials. No complete tabulation of the "Ersatz" foods, for example, has been published, but the number must be great. We know of substitutes for coffee, of the use of peppermint leaves instead of tea, of the use of indigenous herbs in place of imported medicines.

Since the outbreak of the war with England, the search for substitutes had been intensified, and the closing of the Trans-Siberian route subsequent to the declaration of war on Russia has forced Germany to look for other sources of raw materials.

Of particular interest and importance have been the developments in the field of industrial metals and of rubber.

A report of Robert Bosch, G.m.b.H., the largest manufacturers of electrical equipment for road vehicles and aircraft, reveals the extent to which the consumption of certain raw materials has diminished.

	Consumption (Kg)	
	1938	1939
Copper	163,500	20,700
Various brasses	1,057,000	283,200
Silver	1,700	400
Nickel	33,800	100
Tin	9,900	8,200
Lead	306,200	275,200
Rubber	213,500	42,900

Whether or not these figures are accurate they indicate typical savings in scarce raw materials. It is known that bronze and copper have been replaced to a large extent by aluminum, with which Germany is now amply provided.

The quest for substitute metals has led also to the substitution of other materials for various metals. The November 5, 1940 issue of the Vierjahresplan, for example, contained an article illustrating the use of wood, or fiber, for door hinges, in order to conserve brass.

In addition to the substitutes for various metals, the two most notable developments of Ersatz materials have been the production of Buna as a substitute for rubber, of Zellwolle as a substitute for cotton and wool, and of artificial silk.

It is estimated that the Buna plants are producing some 70,000 tons annually. Zellwolle production is probably upwards of 300,000 tons for 1941, and rayon possibly 100,000 tons. The occupied countries, and particularly Norway, have added to Germany's cellulose supply. It may be noted here that there have been recent experiments with the development of a cellulose cattle fodder.

There has been a rapid expansion in the paper yarn industry, which manufactures yarn from cellulose and natural textile fibers. From 80 to 90 factories were reported to be engaged by the middle of 1941 in this line of production. The yarn thus made is used as a substitute for hemp and jute, which are scarce in Germany.

To be numbered among Germany's most notable achievements, is the production of synthetic oil. Using brown coal, brown-coal tar, bituminous coal, shale oil, or coke as a basis, the production has reached an estimated total for 1941 of between 3,000,000 and 4,000,000 metric tons, and may be now as high as 6,000,000 tons.

Since gasoline and Diesel oil are reserved primarily for military vehicles, the commercial vehicles and few civilian cars that are permitted to run, are being adapted to use gas generators. In an apparatus maintained on the vehicle, gas is generated from peat, coke, or wood. Another type of gas, called "Leuna," is distilled from coal or coke and carried on the vehicle under pressure in a tank.

An official German report stated that beginning with October 1941, almost all commercial vehicles will be equipped with gas generators.

The change from liquid fuel to gas generators was accomplished first in the occupied territories. There are 6,000 men working in factories on gas generator production and 3,600 engaged in modifying vehicles for gas generator operation. Approximately 150,000 trucks in Germany and occupied territories were operating on gas generator fuel by September, 1941.

The scope of synthetic and substitute materials has become such a prominent part of the German economy, that it deserves more than casual attention. A self-contained European "New Order," which may find itself still cut off from many raw materials, will certainly be characterized by a further intensification of this program. As a matter of fact, some of the substitute products have proved to be so superior to the original product that they will be maintained in any event.

Synthetic oil and Buna have received the most attention and publicity because of their great importance. There are, however, many other notable achievements.

(1) Rubber.

Synthetic guttapercha and plastics for electric cables.
Molded plastics for hard rubber.
Nifarine for rubber soles (consisting of Buna and fillers).
Thiokol, a Buna product, used for washers, oil tubes, and articles for the graphic trade.
Schwingmetall - a rubber-metal combination.

(1) Rubber (Continued)
Perbunan and Perduren used in production of rolls and blacks. Perbunan used for high relief and flat printing. Perduren used for photogravure and off-set printing.

(2) Leather.
Fiber products such as Fagelane, Fabinette, and Nifarine (Buna and fillers) to replace leather in shoes.
Other synthetic leather products are known under such names as Monako, Kalbun, Elastophan, Taledo, Talceo, and Mipolan. Fish leather also has been used.
Plastics have been used successfully for transmission belts.

(3) Paints, Varnishes, Lacquers, etc.
Plastics to replace paints and lacquers.
EL-Firnis for linseed oil (one-third pure linseed and synthetic resins and gasoline).
Lacquers made of artificial resins, chlorinated rubber, coumarone resin, and phenolic resins.
Substitute materials (slags from iron and steel) for borax, in enamel manufacture.
Synthetic resin of coumarone-indene type for varnish.

(4) Metals and Metal Conservation.
Cupal, a copper-plated aluminum wire to conserve copper.
Plastic bearings for bronze bearings (and said to be 10 to 20 times more efficient).
Aluminum and magnesium alloys instead of bronze for worm gears.
Tooth gears made of plastics and resins to conserve metal.
Music instruments made of a synthetic composition called Plexiglas.
Jewelry made of artificial resins.
Bells made of glass and metal composition to replace metal bells in telephone sets. Plans for larger equipment. Tin cans made of lightly tinned metal and sheet iron.
In 1940, according to G. Matulat of the Reich chemical office 70,000 tons of plastics were used in place of metals in Germany. Thereby an estimated 300,000 tons of iron, steel, and non-ferrous metals were released for other purposes. From 1936 to 1940 the output of phenol-cresol molded plastics increased by 125 percent, of phenols and cresols obtained from tar acids of coke and gas plants by 150 percent. The production of polymerized synthetics was five times greater in 1939 and ten times greater in 1940 than it had been in 1935.

(5) Other Synthetic or Substitute Products.
Artificial silk used for in-lays in tires, transmission belts, tubes, and cable insulators.

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Fibers (Pe-Ce-faser), said to be especially good for fish-nets, shoe-laces, and filter material for chemical processes.
Penta-Methylene-glycol for glycerine.
Synthetic fat (by hydrogenation of paraffin from domestic lignite) for petroleum jelly.
Paraffin mixed with hard wax for candles, instead of stearin and beeswax.
Synthetic fatty acids from paraffin (by means of air oxidation) for fats in soap-manufacturing.
Synthetic camphor.
Synthetic anti-malarials (atebrin, plasmoquine and harmoline manufactured by Bayer A.G.).
Cellon, a noninflammable celluloid substitute.
Trolitan, a phenolic resinoid.
Trolit and Trolitul, diecast synthetic materials.

m. Substitutes for gas and Diesel Oil.

(1) In consequence of the drain on enemy petrol stocks brought about by the Russian campaign, great efforts have recently been made to extend the use of petrol substitutes, particularly compressed gas and producer gas. The following is a brief description of the different types of gas which are employed as fuels for driving motor vehicles:-

(a) Compressed Gas.

1. Propane and butane. These gases are by-products of the synthetic petrol industry. They are good motor fuels. Their portability is improved by the fact that they liquefy at comparatively low pressures. They are carried on the vehicle in liquid form in steel cylinders and are known as "liquefied gases," also in Germany as "Treib-gas". Supplies of these materials are however limited and can only be increased slowly.

2. Methane (natural gas). This gas is found in large quantities in most oil-producing countries and also to a certain extent in Northern Italy. It does not liquefy, except at very high pressures. This limits its usefulness as a motor fuel.

3. Coal gas. Has only about 50% of the fuel value of methane. It does not easily liquefy under pressure. It is compressed in cylinders for use as motor fuel and is known in Germany as "high pressure gas." Owing to the restricted range of vehicles driven by this type of gas, its use is practically confined to municipal and similar services.

(b) Producer Gas. (Gas Generators). The development of producer gas as an alternative fuel was not seriously undertaken in Germany until the present year, although plans to do so were, no doubt, drawn up earlier. It is considered that the number of gas-generator

vehicles in use in Greater Germany already exceeds 100,000 while a further 80,000 of these vehicles may be in operation in the occupied countries. These figures correspond to an aggregate saving of several hundred thousand tons of oil per annum in Axis-controlled Europe.

The gas generator can be run on almost any type of solid fuel which is easily kept alight and does not form clinker. The fuels chiefly used are dried wood, charcoal, anthracite, low-temperature coke, and peat. Both petrol and diesel-driven vehicles can be adopted for the use of producer gas. There is a considerable loss of efficiency and carrying capacity, owing to the low fuel value of the gas and the space taken up by the generator and fuel.

The chief problem, however, which is involved in attaining a very great increase in the use of this type of vehicle, is the provision of the necessary fuel. About 27 pounds of wood or 15 pounds of anthracite are needed to replace a gallon of petrol. There is thus an increase of from 2 to 4 times in the weight of the fuel required, while if wood is used, the increase in bulk is much greater than this. The provision and distribution of adequate supplies of these fuels will add considerably to the total strain on the transport system of enemy occupied countries and, in the case of wood, there are already signs that the present supply cannot be much further increased.

(2) The use of gas-driven vehicles for military operational purposes is attended by serious disadvantages. These are as follows:-

(a) Restricted range.

(b) Extra weight and bulk of the fuel and containers (These apply to all forms of gas fuel).

(c) Slowness in starting (This applies only to producer gas).

(d) A reduction in engine performance equivalent to the sacrifice of an appreciable proportion of the total horse power. (This applies to all types except propane, butane and methane).

4. Shipping.

a. Summary.

(1) Situation as to Axis Tonnage
(as of June 20, 1941)

Mediterranean	More than sufficient for present needs.
Black Sea	Barely sufficient.
Atlantic Coast, Cherbourg to Daker	More than sufficient.
Marseille-French West Africa	Sufficient.
Aegean	Insufficient (can be made good from surplus in Mediterranean).

(2) The above analysis is concerned only with ships in excess of 300 tons.

(3) Losses: Sinkings of Axis ships and ships under Axis control are estimated at 4% of all utilizable tonnage per month for the months of February, March, April, and May 1941.

(4) Potentialities:

(a) In 1940 there were 326 yards in Germany employing 76,324 men, of which 3,206 were engaged in sales, 5,322 in technical and executive work, and 67,488 as skilled and unskilled labor. Shipbuilding is compared with other typical industries in the following table:

COMPARISON OF GERMAN INDUSTRIES

INDUSTRY	NO. OF WORKS	EMPLOYEES	NET PRODUCTION IN MILLIONS OF RM.
Shipbuilding	326	76,324	273.5
Metal working	1,989	148,593	559.5
Leather Goods	1,096	35,323	106.3
Motor Vehicles	91	110,148	636.5

Some commercial shipbuilding has been carried on in the Bremen district in Germany in spite of the war, as indicated by the launching of fishing steamers at Wesermuende during the latter part of 1940.

The Germans now have under their control the Russian ports of Odessa, with its extensive shipbuilding facilities, and Nikolaev, where at the Marty and Kommar shipyard were being built the following vessels:

1 - 35,000 ton battleship
1 - heavy cruiser
several destroyers
submarines

Much of this booty was apparently destroyed or damaged and, of course, was useless to Germany.

(b) Since the entire Norwegian fishing fleet of 1700 vessels has been placed in German control, it is estimated that Norwegian shipping facilities are capable of transporting three divisions.

(c) By the occupation of Denmark, Germany acquired shipbuilding facilities of considerable importance. In 1938 (a record year), for example, Denmark's output was 35 ships totalling 158,430 tons. There were four large shipyards in Denmark. It is believed that 80,000 tons of shipping are being constructed for Germany in Denmark.

(d) The Germans are reported to have drawn up a six years' program for merchant vessel construction in the Occupied Zone. Work is stated to be in progress on 16 ships. Instances specifically reported are 2 ships of 11,000 tons under construction in the Penhoet yard at St. Nazaire for Hapag, and 2 of the same tonnage in the Loire yard.

(5) It is noted that 50 auxiliary sailing vessels were used to transport 200 Germans each to Crete.

(6) It is estimated that between 150,000 and 200,000 tons of ocean shipping are required for each division in an overseas expeditionary force (on the basis of about 10 tons per man for a division of between 15,000 to 20,000 men.)

(7) All shipping available to Axis and Axis tanker shipping strength indicated in Tables I and II.

TABLE I

TABULATED SUMMARY OF ALL SHIPPING AVAILABLE TO AXIS

(As of June 20, 1941)

Country	No. Ships	Tonnage
MEDITERRANEAN SEA		
Germany	335	1,756,084
Italy		
*Belgium		
*Denmark		
*Netherlands		
*Norway	35	109,622
*Greece		
*Yugoslavia		
TOTAL	370	1,865,706
Less Sunk	50	200,000
Net	320	1,665,706
BALTIC & NORTH SEAS		
Germany	668	2,131,373
*Norway		
*Netherlands		
*Denmark	428	1,065,292
*Belgium		
TOTAL	1,096	3,196,665
Less Sunk	-	500,000
NET	1,096	2,696,665

Country	No. Ships	Tonnage
PORTUGAL, CANARY ISLANDS, AZORES & CAPE VERDE ISLANDS		
Germany	55	251,215
Italy		
Denmark	5	9,178
TOTAL	60	260,393
BLACK SEA		
Germany	18	52,332
Italy		
a Bulgaria		
a Greece		
a Hungary		
a Roumania	250	345,883
a Russia		
a Turkey		
a Panama		
TOTAL	268	398,215
OUTSIDE EUROPEAN WATERS		
Germany		
Italy	99	585,934
Denmark		
TOTAL	99	585,934

Country	No. Ships	Tonnage
NORTHERN WATERS		
Finland		
Sweden		
Russia	560	1,202,224
Esthonia		
Latvia		
Lithuania		
V British & Allied	537	2,130,309
TOTAL	1,097	3,332,533

* - Under Axis control

a - Available to Axis (now trading in Axis ports)

v - Vichy-controlled (detained in French ports)

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TABLE II

AXIS TANKER SHIPPING STRENGTH
(as of June 30, 1941)

Region	Tonnage (G.R.T.)	
	Est. Minimum	Est. Maximum
Northern Waters	534,000	548,000
Mediterranean and Black Sea	193,000	253,000
Shipping in ports of refuge	106,000	106,000
TOTAL	833,000	907,000

Note: At the outbreak of the war, Germany had 50 tankers, totaling 263,003 G. R. T.

As of June 30, 1941 tankers constituted 12.5 to 12.6% of all available Axis shipping tonnage.

5. Commerce.

a. Foreign Trade.

(1) Volume of Foreign Trade. In blockaded Germany all data on imports and exports are naturally considered a military secret. Therefore, since publication of the regular trade returns on the Reich's foreign trade was discontinued at the outbreak of the war, the only official sources of information on Germany's total exports and imports and her foreign trade with individual countries are the occasional references made to this subject in public addresses and in articles prepared by German officials and in the usually incomplete statistical data revealed in connection with trade negotiations.

The influence which the German military successes of April-June 1940 had on the Reich's import and export trade were of a conflicting nature. On the one hand, the extension of the German front to the western shores of Europe "from the North Cape to the Bay of Biscay" automatically made the British blockade applicable to the whole of western Europe. It closed the loopholes through which certain oversea products found their way into Germany during the first phase of the war. Italy's entry into the war in June 1940 had a similar effect in regard to the Mediterranean and Germany's southern borders.

On the other hand, the occupation of a number of countries in northern and western Europe and the virtual encirclement of other countries brought them and their resources under the control of the Reich, making the latter not only the main supplier especially of such essential materials as coal and steel, but also the principal market for their products.

The expansion of Germany's trade with these countries has to some extent made up in value for the loss of oversea trade, although the foodstuffs and raw materials which the Reich has been able to draw from these states, except in a few instances, cannot be regarded as an adequate substitute for imports from oversea.

A statement by Dr. Eicke, an outstanding government expert on German foreign trade, indicates that in December 1940 the Reich's foreign trade turnover had practically reached its pre-war level. This assertion was reiterated in the address of Herr Walther Funk, Reich Minister of Economics and President of the Reichsbank in his address before the annual meeting of the Bank's shareholders on March 12, 1941. Herr Funk admitted, however, that the increased value of Germany's wartime foreign trade was "largely" due to higher prices. According to private German estimates, about one-half of the increase in the value of German trade with European countries was due to greater physical volume and the other half to higher prices. This estimate is supported by data relative to the prices charged by Germany since the outbreak of the war for certain staple export goods, such as coal and steel, and by foreign trade figures published during the war by northern and southeastern European countries. These figures clearly show the

effect of higher prices on the value of both imports and exports.

As stated in the address of Dr. Eicke referred to above, the Reich's balance of trade was favorable during the first period of the war, but subsequently it became unfavorable owing to the Reich's heavy imports from European countries and its inability to pay for them fully by exports in spite of all efforts made to keep the German export capacity at the highest possible level.

This statement is confirmed by available data regarding the movement of German clearing balances with occupied and unoccupied territories. In most occupied countries, especially in Denmark and the Netherlands, these balances were against Germany. Thus, according to the returns of the National Bank of Denmark, the Reich owed that country 449 million kroner at the end of January 1941 for imported merchandise. In non-occupied countries where for obvious reasons Germany had to pay greater attention to the balancing of imports and exports, this tendency was less pronounced, and in some cases the clearing balances were even in favor of Germany. Thus, the Reich's credit balance with Yugoslavia rose to 76 million marks on February 15, 1941, due apparently to the failure of that country to maintain its exports of certain foodstuffs on the planned level as a result of an unsatisfactory grain crop.

(2) Germany's Wartime Trading Partners. In his Reichsbank address on March 12, 1941, Herr Funk stated that the value of Germany's trade with European countries had increased by 65% since the beginning of the war. How this increase was distributed among individual states has not been revealed, but published information indicates that three countries stood out as the Reich's principal wartime trading partners, namely the Soviet Union, Sweden, and Italy, and that as a result of trade agreements which were concluded with these three countries in the period from December 1940 to February 1941 their share in the Reich's foreign trade during 1941 was expected to become still more preponderant. (Trade with Russia ceased by the end of June 1941 with the declaration of war on Russia.)

In regard to Soviet Russia, it has been stated that as a result of the trade agreements of September 1940 and February 1941 German imports from this country equaled during the autumn months of 1940 the monthly average established in 1930 when for the year they totaled 436,000,000 marks compared with a low of 47,000,000 marks in the last peace-year 1938*. This contention seems, however, only to apply to the monthly turnover reached toward the end of 1940 and not to the year's total.

The value of Sweden's foreign trade with the Reich increased considerably during the latter part of 1940 after it had been cut off from British, American and other oversea markets. Owing to large deliveries of iron ore, timber, cellulose, and paper stipulated in its new trade agreement with Germany signed in December 1940, Sweden's foreign trade turnover was expected to increase by 40%, namely from

*See Appendix A for a detailed analysis of Russia's position in the German Trade.

about 1.4 billion kroner in 1940 to 2 billion kroner in 1941.

As a trading partner of the Reich, Sweden would then only be out-stripped by Italy, whose commerce with the Reich has increased four-fold since 1933. Italian trade was expected to expand still further as a result of the new trade pact between the two countries which was signed on February 26, 1941. In a press interview granted in Rome after signing the new agreement, the German negotiator, Dr. Clodius, stated that the total turnover between the two countries is expected to reach 2 billion marks in 1941, which would raise Italy to the first place among Germany's buyers and suppliers.

The outstanding characteristic of German-Italian trade is that while the Reich supplies its ally with coal, steel, and other materials essential for the conduct of the war, Italy exports to Germany sulfur, mercury, pyrites, bauxite, silk, rice, and fresh fruit and vegetables. Since Germany undertook in March 1940 to supply Italy by land with its total requirements of coal, these shipments are claimed to have been effected at the rate of one million tons per month.

A common feature of Germany's foreign trade with most European countries toward the end of 1940 and in the beginning of 1941 was the Reich's high and constantly growing share in their exports and imports, which is an evidence of a greater gravitation of their economics toward the Reich since they have been cut off from Britain and overseas markets. According to the incomplete information available in this respect, the Reich accounted in 1940 for 60 to 70% of the foreign trade of most European countries, and in the case of Slovakia this share was even as high as 80%.

The extent to which small European countries, the trade of which was formerly oriented toward Britain, western Europe and overseas countries, have become dependent on the German market under present conditions of blockade, may be further illustrated by the example of Finland. In 1938 Finland's exports to Germany represented 14.8% of its total shipments abroad, while Germany accounted for 20% of Finnish imports. Under the trade agreement between the two countries which was signed at the beginning of March 1941, the volume of German-Finnish trade is expected to reach 7.4 billion Finnish marks in 1941 which, according to reports published in the German press, would constitute about 80% of Finland's 1941 trade volume as presently planned.

(3) Different Types of Trade Agreements. Military, political, and economic considerations were instrumental in determining the various types of trade agreements which were concluded by the Reich with other European countries during the year 1940. Four trade pacts signed during the period from December 1940 to February 1941 were particularly characteristic of the degree of political and economic control which the Reich exercised vis-à-vis the respective countries.

In the case of Italy, Germany is obviously the giving partner, supporting its ally for political and military reasons without even expecting to obtain full counter-value for deliveries. The economic pact with Rumania, which was signed in December 1940, may be

considered as characteristic of cases where the Reich largely controls, or expects to control, the national economy of its partner with a view of extracting a maximum of supplies, especially of foodstuffs and essential raw materials. Finally, Germany's trade agreements with independent countries, such as Soviet Russia and Sweden, which apparently insisted on the observance of a "give and take" rule and on the strict balancing of imports and exports, seem to occupy in this respect a middle position.

Official German comments on the trade pact between the Reich and Italy signed in Rome on February 26, 1940, left little doubt that, although a pooling of economic resources was the avowed goal of this agreement, Germany does not expect to obtain the full value of its deliveries to Italy, since the partners agreed not to insist on a strict balancing of accounts. This general principle was further emphasized by Dr. Clodius who stated that "the present clearing balance in favor of Germany would not cause any delay in the expansion of the German-Italian exchange of merchandise." It is of interest that one of the main items by which Italy expects in part to balance German clearing claims for exports of essential war materials to that country are the remittances of Italian workers in Germany, whose number under the new agreement was expected to increase from some 100,000 at the end of 1940 to over 300,000 in 1941. According to an estimate published in the German press, these annual remittances of savings by Italian workers were expected to reach the substantial amount of over 250,000,000 marks per annum.

In the economic pact of December 4, 1940, the Rumanian government requested German "support and cooperation" in the execution of the Rumanian Ten Year Plan, while Germany declared its willingness to "accord technical and financial assistance for the reconstruction of all branches of Rumanian economy."

Long-term credits granted by Germany under special conditions, supplies of agricultural machines and implements, technical and financial assistance in promoting industrial production, and investment of private German capital in Rumanian industry and banking, are the means by which the aims of the Rumanian Ten Year Plan are to be reached.

With a view of linking the Rumanian economy more closely to that of the Reich, special attention is given in the Reich's economic accord with Rumania to the development of the transportation system, and in particular to the construction of pipe-lines to render the all-important Rumanian oil supplies more available to the Reich.

In contrast to the economic accords with Italy and Rumania, the trade agreement with Soviet Russia signed on February 11, 1940 and renewed on January 10, 1941 provided for a strict balancing of mutual purchases and deliveries. In spite of the great efforts made by German industry to fulfill its obligations toward the Russian government and the absolute priority given in 1940 to Russian export orders for other countries, Germany is reported to have fallen behind with its deliveries in 1940. Special provision had eventually to be made for the payment, in cash and in kind, of the balance due by Germany for 1940 Soviet shipments of food and raw materials.

A spirit of "hard bargaining" characterized German-Russian trade relations. Thus, quarterly balancing of mutual deliveries instead of balancing for the entire year was stipulated in the new agreement signed January 10, 1941.

(4) Expansion of the Reich's Customs Territory. The extension of the Reich's military control on the continent during the past year was paralleled by a widening of the German customs territory, although the boundaries of the two regions do not always coincide. The extent to which tariff systems of the conquered and occupied territories have been brought under the Reich's control varies from complete incorporation in the Reich's customs territory, as in the "definitely annexed" provinces and districts of Poland, France and Belgium, to formal tariff independence, as in the cases of Denmark and Norway. The customs regime of the Netherlands occupies a middle place between these two extremes, with customs free importation of German and Dutch merchandise.

The newly conquered districts which were completely incorporated in the Reich's customs system by the beginning of 1941: (1) the Polish regions now forming part of the Reich provinces Danzig-Westpreussen, Wartheland, and Upper Silesia, (2) the Duchy of Luxemburg, (3) the annexed Belgian communes Eupen, Malmedy, and Moresnet, of which the two former belonged to Germany prior to 1919, (4) the entire province of Alsace, and (5) the formerly German part of French Lorraine. The import duties of the German tariff are levied on the outer borders of these territories, and practically all restrictions on the trade between them and the old Reich have been removed.

Of greater economic importance than the customs incorporation of these newly conquered territories was the abolition of the tariff barriers between the Reich and Bohemia-Moravia which became effective October 1, 1940. Article 9 of Hitler's Proclamation of March 16, 1939 relative to the "Protectorate" Bohemia and Moravia already provided for its future incorporation in the Reich's customs territory, but the actual abolition of the tariff barriers between the Protectorate and the Reich was postponed on the ground that economic conditions in Bohemia and Moravia, especially prices and wages, had first to be adjusted to those in the Reich.

After the price and wage level in Bohemia and Moravia had been brought nearer to that of the Reich by several upward adjustments, these former parts of Czechoslovakia were considered ripe for their inclusion into the Reich's customs territory which was carried out by the decree of September 16, 1940. In order, however, to avoid unnecessary dislocation of production or markets, a system of provisional agreements between the Protectorate's and the Reich's industries had been evolved restricting mutual competition during a transition period. In most cases these intra-industrial agreements were limited to products in which competition would be particularly keen. In order further to equalize

production costs, the Reich's consumption and turnover taxes were introduced in the Protectorate and, serving the same end, the Reich's railroad freight rates were introduced on all Czech railroads effective January 1, 1941.

In contrast to the Protectorate, the General Government Poland has so far preserved the old Polish tariff, and forms a separate customs territory, with the exception of the "incorporated" Polish provinces already referred to. The products of these provinces enjoy, however, certain tariff privileges when imported into the territory of the General Government, while German products have to pay the old Polish coventional tariff rates. Import and export transactions between the Reich and the General Government are subject in both directions to the same formalities in respect to licensing et cetera, as in the Reich.

Another procedure which was followed in abolishing the tariff barriers between the Reich and the Netherlands at the end of 1940, provided for the duty-free importation into the Reich of products of "Dutch origin," a measure which was paralleled by a similar order of the German occupation authorities in the Netherlands providing for duty-free importation of German goods into occupied Dutch territory, except for the payment of certain compensatory charges for such products as alcohol, beer, sugar, and salt.

These measures cannot be considered as effecting a straight customs union between the two territories, since only goods of German and Dutch origin may pass free of duty from one country to the other, while foreign goods imported into Germany or the Netherlands cannot be exported to the other territory without the payment of duty.

(5) Extension of Multilateral Clearings. In 1940 the Reich's foreign trade with the various occupied and unoccupied European countries was in general carried out on the basis of the clearing arrangements existing before the war. In cases where clearing agreements were interrupted by the war, as in the case of the Netherlands, Belgium, and France, the old clearing agreements were again put into force with certain necessary adjustments due to changed conditions.

A new factor in this situation is the policy of the Reich, as revealed in numerous speeches and articles by German officials, to substitute central multilateral clearings through the intermediary of the Deutsche Verrechnungskasse or German Clearing Office in Berlin for bilateral clearings. Multilateral clearings are considered an essential element of the "New Economic Order" which the Germans hope to impose on Europe if they are victorious.

(6) Shifts in Foreign Trade. In the absence of published statistics of the Reich's foreign trade during the war, some of the statements, however vague, made by Herr Funk in his Vienna address on June 12 regarding the volume and direction of German foreign trade are of interest. After reiterating his former claim that in the course of

1940 "the value of the Reich's foreign trade turnover had approximately reached its pre-war level," Funk volunteered the following information on this subject:

(a) The value of Germany's imports from southeastern Europe had reached an annual value of 1,300,000,000 RM or 400,000,000 RM more than in the preceding year; Funk omitted, however, to state to what extent this increased value was due to higher prices - a factor which is known to have played an important role in the valuation of exports from the Balkans to the Reich, expecially from Yugoslavia and Rumania.

(b) The value of imports from Soviet Russia was ten times higher than in the last peace year 1938, while the value of Italian exports to Germany had been doubled.

(c) Germany had been able to import sizeable quantities of soybeans from Japan--a statement which manifestly refers to the importation of Manchurian soybeans in transit via Siberia.

Since the outbreak of the German-Soviet war, the references to Soviet Russia and to the importation in transit of products from the Far East can now only have a bearing on past developments in the Reich's war-time foreign trade. They indicate that with the beginning of hostilities these two sources of supplies have been blocked, and that Germany's foreign trade is more than ever restricted to such European countries as are directly or indirectly under German control, at least as far as their foreign trade is concerned.

In the East, Turkey is now the only country with which the Reich can still maintain a certain amount of foreign trade. In this connection, the exchange of notes which accompanied the signing of the amity and consultation pact between the Reich and Turkey at the end of June, are of some significance.

During the earlier part of the European war, German imports from Turkey were limited mostly to tobacco and dried fruit, according to German press reports. During the first quarter of 1941 Germany also imported certain quantities of tanning materials, sheepskins, linseeds, and casings. The hope has now been expressed in German press comments that following the conclusion of the new treaty Germany will also be able to obtain from Turkey certain quantities of chromium* ore, cotton, and wool.

b. Domestic Trade.

In 1941 it is difficult to distinguish where foreign trade leaves off and domestic trade begins, and vice versa. In one sense it would be possible to classify all of Germany's present trade as "domestic," since by one means or another every country in continental Europe has come under her direct or indirect control.

By August, 1939, at the time of the last economic estimate, Austria, Czechoslovakia, and Memel had been annexed and became classified as domestic trade.

* See Page 21 of this Economic Estimate for details of the October 1941 agreement with regard to chrome.

From September 1939 to the beginning of the Russian Campaign in June 1941, the following were added to Greater Germany's rapidly growing orbit: Poland, Denmark, Norway, Luxembourg, the Netherlands, Belgium, France, Hungary, Rumania, Bulgaria, Yugoslavia, Greece and Crete.

Since June 22, 1941, Germany has further expanded with the conquests of Esthonia, Latvia, Lithuania, East Poland, Bessarabia, and the Ukraine.

As Germany supplies these countries more than before, and since the exports of these countries are necessarily limited to Germany and German-controlled territories, they may now be classified as domestic trade.

The extensive system of railways, waterways--both natural and canal--and highways has been further expanded to connect the principal distribution centers. Whereas there were some ten or a dozen important areas in the old Reich, including Berlin, Cologne, Leipzig, Magdeburg, Dresden, Frankfurt-am-Main, Kassel, Mainz, and Frankfurt-on-Oder, and subsequently Vienna, Prague, and Memel, by the end of 1941 practically every important city in Europe had become a part of Germany's new economic order.

It will be some time before the entire economic reconstruction can be attained, but there is every reason to believe that great strides have already been made in this direction. Until some later date the economic history of Germany and Europe must remain one of considerable speculation. Because of this, only the facts that are known thus far are evaluated here. Statistics with regard to exports and imports are necessarily secret in war time, but certain events in the last two years with regard to trade are of interest and are recorded here as the major developments since 1939.

5. Transportation. *

a. Inland Waterways. The German inland waterway system has an over-all length of 8,220 miles, which, in its extent, ranks next to that of Russia and the United States. (Russia 90,000 kilometers, U.S. 53,000 kilometers, Germany 13,700 kilometers.) Forty percent of the rivers and canals are not navigable on a commercial scale, and therefore practically the entire water-borne traffic of Germany is carried on 60% of the waterways--or 4,932 miles, of which 1,320 miles are artificial.

Acquisitions up to August 1940 increased the German waterways by 2272 kilometers. Of the total increase, 118 kilometers fell to the share of the Saarland; 420 kilometers to former Austria, 215 kilometers to Memelland; 86 kilometers to Sudetengau; and 1433 kilometers to the re-incorporated Eastern regions (formerly Poland).

* Studies on the present German Railway System are available and are not included in this report. Other reports are being prepared.

The intensive use of the waterway system began in the World War and has increased until it is believed that the waterways will be utilized during the present war to transport at least 25% of the total freight of Germany.

Perhaps the most ambitious project of recent years is the plan to connect the Rhein, the Main, and the Danube. A law of May 11, 1938 provided for the expediting of the project for a 1500 ton boat waterway from the North Sea across Europe to the Black Sea. The scheme was adopted as a part of the Four Year Plan, with the evident purpose of drawing the entire Danube basin into the great economic New Order under Germany's leadership. This integration has, no doubt, been thoroughly planned to run concurrently with other major plans, such as the creation of a pan-European network of water power resources, referred to in another chapter.* The Rhein-Main-Donau scheme was scheduled to be completed by 1945. Electric power plants are being planned and constructed along the proposed route, and large industries are being encouraged. Thus, the Danube waterway has an important place in the scheme for the relocation of industry.

The International Commission, established under peace treaties to control Danubian navigation, was dissolved in September 1940. At the close of the Anschluss with Austria, the Commission was forced to withdraw to Belgrade, and its control was reduced to the section of the Danube between Bratislava and Braila. The exclusion of Franco-English influence from the Balkans rendered the Commission ineffective and it was dissolved since it was regarded as contrary to the spirit of the new Danubian order.

The major rivers in the waterway system are the Rhine, Weser, Elbe , Oder, and Danube, which are fed by some 33 tributaries of various lengths.

There are 21 canals in use (seven of which are referred to collectively as the "Mittelland" Canal), 7 canals are under construction, and 8 projected.

Credibility may very well be given to the report that France was planning to tie her river and canal systems to the Danube river for the creation of a connection between the Atlantic Ocean and the Black Sea. Small canals already connect the Seine and the Rhine with the Danube, but the present plan would enlarge the system and accommodate larger vessels.

Director Erich Schreiber of the Inland Shipping Section, National Traffic Department, stated that the 1941 volume of Inland Waterways traffic increased more than 20 percent compared with the previous year and reaches peacetime record compared with the 1940 increase in percentage as follows: ore 77, lumber 37, building material 36, coal 20. Schreiber stated that it was impossible to further relieve railroads by waterways for transport of bulk goods. Barge motors are to be changed to gas fuel and the same type motors are to be used in all ships so that generators may be manufactured in series.

*See Electric Power

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6. Communications.

a. Cables. The German system of submarine cables has a total length of 6,170 nautical miles (n.m.), of which 2,181 are operated by the Government and 3,279 by a private company.

At the outbreak of the World War in 1914, the German cable system approximated 20,000 nautical miles, of which about 17,000 were operated by private companies and 3,000 by the Government. The privately owned system comprised two transatlantic cables from Emden to New York, via the Azores; a System in the Pacific owned by a German-Dutch company which provided service to the Netherlands, Indies, Guam, Yap, and Shanghai; and another route linking Germany with South America by way of Africa. Most of these cables were seized by the British, French, and Japanese Governments, and under the Treaty of Versailles were ceded to the principal allied and associated powers.

(1) Government System: The domestic cable network of the German Government comprises 58 cables having a combined length of 710 nautical miles. Nearly all of them are telephone cables, and most of them are relatively short, 46 being under 10 nautical miles in length. The number of conductors ranges from 1 to 112 per cable, the total for the 58 cables being 836.

The Government's international system comprises 22 cables with a total length of 2,181 nautical miles, linking Germany with Danzig, Sweden, Denmark, Norway, Great Britain, and Switzerland. This system is in general, jointly owned with the respective countries. These 22 cables have a total of 516 conductors. The longest cables in this network are two from the island of Sylt to Arendal, Norway, one laid in 1879 (3 conductors) is 246 nautical miles, and the other, laid in 1906, is 298 nautical miles; one from Norden to Great Britain, via the island of Norderney, laid in 1913 is 254 nautical miles; and 4 between Emden and England, via the island of Borkum, laid between 1871 and 1901, each with an average length of about 235 nautical miles.

(2) Private System: The Deutsch-Atlantische Telegraphengesellschaft, usually referred to as the German Cable Co., operates 3 cables with a total length of 3,279 nautical miles. One laid in 1926 between the island of Borkum and Horta, Azores, has a length of 1,884 nautical miles, and another between Borkum and Vigo, Spain, laid in 1929, is 1,134 nautical miles in length. The third cable is that between Borkum and Dumpton Gap, England; laid in 1896, it has a length of 261 nautical miles.

Prior to the outbreak of the present war in Europe, the cables of this company connected with those of American, British, Italian and French companies at the Azores. Since the outbreak of hostilities, however, the German company's cables have been cut, presumably in the English Channel, according to reports.

b. Radio and Television. In keeping with the intensive rationalization program, standardization measures restricting the number of models to 138 were to be effected in 1940. (At the Radio Show in 1939,

266 were displayed.) The number of different types of parts were to be reduced by 65% and in some cases by as much as 98%.

The total number of receiving sets on March 31, 1939 numbered 12,415,121 (compared with 9,574,791 for the previous year), and, according to German press, there were, on October 1, 1940, 14,708,979 licensed receiving sets in Greater Germany, exclusive of the Protectorate Bohemia and Moravia and the new Eastern Provinces. With probably some 16,000,000 total sets in use, Germany ranked second to the United States. The number of licensed radio receiving sets in Bohemia and Moravia was 912,116 as of August 1, 1941, an increase of about 11% over the same date last year, according to the Prague Statistical Office. Almost 25% of all listeners are located in Prague.

In 1940 radio-telephone service was inaugurated between Germany and Bolivia.

Up to the present war, new links had been added in the radio-telegraph service, and the number of radio stations on board German vessels recorded an increase of 35% in 1939.

There were approximately 10 short-wave broadcasting stations operated by the Nazi government in Germany in 1941.

Punishments for listening to foreign radio broadcasts have been severe, including long terms of imprisonment, and, for the first time, some death penalties were announced in 1941.

In 1938 the wirephoto traffic gained 200% in domestic service, with over 11,000 pictures handled; 1,057 pictures were sent to foreign countries, as compared with 878 in 1937.

The wireless transmission of television programs in Germany was discontinued at the beginning of the war, while the transmission of television programs by cable was resumed by the Reichspost Television Ltd. three weeks after the outbreak of hostilities. The network of sound-television cables was expanding. Plans had been made to extend the television-telephone cables to serve the double purpose of radio-television and radio-telephone service. Germany was the first country to take up television-telephone service on an experimental commercial basis.

c. Telephone and Telegraph. From 1938 the number of telephones increased by more than half a million and reached 4,100,000 on March 31, 1939, of which about 3,800,000 instruments were for the former Reich alone.

After the absorption of Austria, the proportion of telephones to the number of inhabitants and territorial area dropped to 5.2 telephones per 100 inhabitants, a decline of 1.7%, and about 7 instruments per sq. kilometers, a decline of 8.1% from the previous fiscal year.

While the telephone continued its development, there was a pronounced decline in the use of the telegraph in recent years, but a recovery was noticeable during the fiscal year ending March 31, 1939.

7. Finance.

a. National Income and Expenditures. Since the beginning of the war with England, there have been notable changes in Germany's budget. War expenditures and financial data in general are closely guarded secrets, of course, but from available information the following estimates are presented:

The total disclosed Reich debt on September 30, 1941 amounted to 114,400,000,000 RM, nearly double the amount at the end of March 1940, before the campaigns in western Europe. (The increase in indebtedness in the first half of 1941 amounted to 21,716,000,000 RM.) The total increase in the Reich debt during the first twenty-five months of the war was about 77,000,000,000 marks.

It is estimated that Germany's military expenditures for the first two years of the war have been 100,000,000,000 marks, which is equivalent to the estimated current national income.

The Reich's expenditures for the fiscal year 1941 are calculated at between 72 and 74 billion marks, nearly three-quarters of the estimated national income. Allowing 20 billion marks for non-military expenditures, the pace of 50 billion marks a year for war is being well maintained.

(It may be noted that for its war-time financing, Germany has leaned more and more heavily on borrowings, and to a greater extent on short-time loans, rather than on medium or long-term loans.)

Government tax returns for the fiscal year, 1940, yielded 27,200,000,000 marks, as compared with 23,500,000,000 in 1939, and 17,700,000,000 in 1938. Revenues for 1941 were expected to reach 30 billion marks. The total income from revenue, occupation costs*, and contributions for 1941 will possibly reach 40 billion marks.

*It has been estimated that at present the occupied countries are contributing annually fifteen billion RM to Germany. This represents "occupational costs" as well as sums in RM standing to country's credit in clearing. Occupied territories are thus financing about one-sixth of Germany's total public expenditure, which is estimated at one hundred and ten billion RM annually. The total civil expenditure of Germany is estimated at about thirty-nine billion RM. The occupied countries are, therefore, replacing about 40% of the reduction in standard of living inthe greater Reich, or alternatively, over 20% of the war effort cost. Amounts Paid, Per Day to the Reich by Various Countries as the Cost of Military Occupation:

France	300,000,000 francs
Denmark	1,500,000 crowns
Norway	3,500,000 crowns
Belgium	2,400,000 Reichmarks
Netherlands	1,200,000 Reichmarks
Rumania	1,750,000 Reichmarks

b. Taxation. At the outbreak of the war, a Supplementary Income Tax amounting to 50% of the normal income tax was introduced for all incomes exceeding RM 2,400 per annum. The Corporation Tax was originally exempt from this surcharge, but in the fall of 1941 German companies have become liable to a surcharge of 25% of the normal annual Corporation Tax. Thus the Corporation Tax plus the surcharge will be increased on profits up to RM 100,000 per annum from 30% in 1940 to 37½% in 1942, and on profits exceeding RM 100,000 from 40% in 1940 to 50% in 1942.

c. Summary. While Germany's national income rose from 76 billion RM in 1938 to 100 billion RM in 1940, the national debt rose from about 50 billion RM in 1938 to 80 billion RM in 1940, and to 114,400,000,000 RM by September 30, 1941. (It must be pointed out again that the disclosed figures do not reveal the extent of Germany's "secret debt.")

d. Banking and Currency. The Reichsbank's note circulation reached a war-time high of 17,793,000,000 reichsmarks by the end of November 1941. Bills and checks discounted rose to 18,015,800,000 by September 30, 1941.

It may be assumed that there was a concomitant increase in the circulation of the "occupation marks," although no information has been published as to the extent of this auxiliary currency.

In Russia the exchange rate between the "occupation marks" and Soviet currency has been fixed at 10 rubles to one reichsmark, compared with the prewar rate of 2 rubles to one mark. Thus, the Soviet currency has been devalued five times in German-occupied territory.

The zloty currency has been introduced in that part of Eastern Galicia which was incorporated in the Government General Poland. The rate of exchange of Soviet rubles against zlotys has been fixed at 5 rubles to 1 zloty, which corresponds to the rate of 10 Soviet rubles to 1 reichsmark formerly fixed for German "occupation marks."

The attention of the Reich's financial experts continues to be focused on the nation's huge excess purchasing power, which is considered the root cause of all financial evils. Recent increases in the taxes on tobacco and alcohol and the device of "iron savings" apparently are deemed inadequate to absorb these idle funds, and higher taxes on other consumption goods are believed in informed circles to be the order of the day. The new form of "iron savings accounts" exempt from all Reich taxes and social fees was announced in 1941 for all wage and salary earners who undertake not to draw on such accounts before the war is over. The interest rate payable on "iron accounts" will be the same as that applicable to normal bank accounts, but is tax free.

Backed by the machinery of a totalitarian State, the German price-control authorities claim to have prevented any major increase in the cost of living during the second year of the war, and the official living cost is said to have risen only from 131.6 in September, 1940, to 133.3 in September, 1941.

On the other hand, the Axis-sponsored Croat State seems to have established a new European record with a rise in its cost of living by 74% since September, 1940, when it formed part of Yugoslavia, according to an analysis of the cost of living in Europe, published by the Reich's Statistical Bureau.

On January 15, 1942, Dr. Hans Fischbock was appointed by Adolf Hitler as Reichs Commissioner for Prices with the rank of Secretary of State, succeeding Gauleiter Joseph Wagner, who had held the position since 1936.

Herr Fischbock has been Economic and Financial Commissioner General for the Occupied Netherlands. He is an Austrian, formerly connected with the Phoenix Life Insurance Company, which collapsed in 1936 and which he liquidated.

8. Population. Figures on the population and the territory of the Reich in May 1940 were released by the Reich Statistical Bureau. They include the increases as a result of the Reich's annexations up to May 1940, and, while the figures were preliminary, they are of interest.

The population of the Reich for May 1940 was given as 89,634,000 to which should be added 7,000,000 of the Protectorate, Bohemia and Moravia. Furthermore the population of the "General Government Poland" is estimated at 10,600,000 which brought the grand total of all territories to approximately 107,200,000 by May 1940.

Excluding the General Government Poland, the territory of the Reich expanded from 468,620 sq. kilometers in 1933 to 730,196 sq. kilometers by May 1940, while the population increased from 68,474,132 in 1933 to 96,634,000 by May 1940.

While any figures at the present are incomplete, it has been estimated that from March 1938 (seizure of Austria) to June 1941 (conquest of Greece and Crete), Germany added a grand total of 743,350 square miles, and 147,197,000 population. These figures, subject to revision, do not include the territory or population under German control in Russia (estimated in November 1941 at 650,000 square miles and 65,000,000 population).

The year 1940 may be recorded in history as the year of the greatest national migration within Europe. Approximately 500,000 people either of German origin, but of foreign nationality, or who were German citizens living abroad migrated by choice or by necessity to Germany.

Financial arrangements for this migration were entrusted to the Deutsche Umsiedlungs-Treuhand-Gesellschaft m.b.H. (German Repatriation Trust Association) by the leader of the SS, Heinrich Himmler.

In a report published by this Association it is stated that the following German groups were repatriated in 1940:

From Esthonia	13,385
" Latvia	52,750
" South Tyrol	64,000*
" Volhynia, Galicia, and the Narew Districts	130,000
" the General Government (Poland)	30,116
" Bessarabia	90,746
" North Bucovina	27,481
" South Bucovina	54,650
" Dobruja	14,500
Total	477.628

These figures do not include about 17,000 people of Estonia and Latvia and 47,000 of Lithuania who also migrated to Germany. According to various agreements in 1939 and 1940. it was expected that some 640,000 Germans would be brought back to the Reich, from the Baltic States, Soviet Poland, General Government, Bessarabia, Bucovina, and Dobruja.

In March 1941 Geo-Politik presented the following estimates, which are interesting for comparison with the list above. To be noted particularly is the divergence in the totals for North Bucovina.

There came from:

Latvia	48,868	Germans
Esthonia	12,868	"
Volhynia, Galicia, and the Narew territory	128,047	"
Cholmer and Lublin	32,000	"
Bessarabia	93,548	"
North Bucovina	44,370	"
South Bucovina	52,107	"
Dobruja	13,988	"
Total	425,796	"

There will come from:

Lithuania	45,000	"
Esthonia and Latvia	12,000	"
Total	57,000	

The figures given above for repatriated groups are only partial.** What will happen to the rest of the German-speaking inhabitants in France, Poland, Rumania, Hungary, Yugoslavia, Italy, Latvia, Denmark, Lithuania, Esthonia, Belgium, and Russia? In these countries the figures estimated

*Of the 206,000 people of German origin in South Tyrol, who voted for repatriation, only 64,000 so far have crossed the German border while the repatriation of those in nearly all other European districts has been virtually concluded.

**For a preliminary analysis of the resettled groups in the northeast see Appendix D.

range from 1,500,000 in France to about 16,000 in Esthonia. Only inconclusive and partial figures are now available.

Then too, what of the great numbers of minorities within the Reich which have already been repatriated in the countries of their origin, or in other countries?

What has happened, and what will happen to the number of Jews residing in Reich territory? On May 17, 1939, the date of the racial census, there were some 446,000 confessional Jews, including the so-called crossbreeds of the first and second class. They represented .56% of the total population. *

We know that some resettlement has taken place, but the exact extent is unknown, and the entire question of resettlement would be one of Germany's major post-war problems, in the event she should win.

According to German newspaper reports in February, 1942, the colonization begun in the autumn of 1939 and completed at the end of 1941 in eastern Germany has permanently established in Wartheland 500,000 evacuees from the eastern European territory, extending from the Bay of Finland to the northwestern shore of the Black Sea. Students of both sexes, including prospective teachers, physicians, farmers, contractors, artists and historians assisted in the work under the supervision of the Reich's Commissar for the welding of the German national migrants. The majority of these were agriculturists and artisans. They included Bessarabians, Balts, Poles, Russians, Galicians, and Lithuanians, who were distributed evenly throughout Wartheland (conquered Polish territory along the river Warthe), which is now considered Germany's melting pot and the nucleus of the extensive post-war scheme for the Germanization of the eastern territory.

a. Vital Statistics. As evidence of the efficiency of a "planned" increase in population, it may be noted that in 1933 the birth rate was 14.7, in 1937 it increased to 18.3, and by 1939 (including Austria) it has reached 20.3 - or a total increase of 5.6.

Statistics for May, 1941, the last month for which we have figures, offer further proof of the influence of active campaigning upon the incidence of marriages and births. It has been explained that because home leave was not granted to soldiers on active duty, the number of marriages in May, 1941, totalled only 32,215, representing a decrease of 36.7% over the figures for May, 1939. Similarly, the number of births fell off by 150,000 between January and April, 1941, as compared with the same months of 1940, while with May, 1941, the normal pre-war statistical average is again attained, because husbands had been able to return to their families by the autumn of the preceding year.

*Includes Austria and the Sudetenland, but excludes the Protectorate of Bohemia and Moravia, as well as the areas annexed following the Polish War.

The following tables compare the pre-war statistics of 1939 with the war-years 1940 and 1941.

Comparative figures[2*].

	Marriages	Births: Children born alive	Births: Children born dead	Deaths: Total[1*]	Deaths: of which children under 1 year
May 1941	55,561	146,086	3,223	85,226	8,492
May 1940	65,449	143,357	3,186	91,318	9,717
May 1939	87,776	140,648	3,214	85,364	8,372
January to May 1941	283,142	610,705	14,602	472,003	45,064
January to May 1940	370,918	757,243	18,207	516,629	52,618
January to May 1939	333,170	685,925	16,425	466,034	45,482
	For every 1000 Inhabitants				For every 100 born alive[3*].
May 1941	7.9	21.5	0.5	12.7	7.4
January to May . . .	8.3	18.7	0.5	14.3	8.3
Comparative figures[2*].					
May 1941	8.1	21.3	0.5	12.4	6.6
May 1940	9.6	20.9	0.5	13.3	6.7
May 1939	12.9	20.7	0.5	12.6	6.0
January to May 1941	8.5	18.2	0.4	14.1	7.3
January to May 1940	11.0	22.5	0.5	15.4	7.2
January to May 1939	10.1	20.7	0.5	14.1	6.6

1*Not counting deaths in the armed forces.
2*Omitting the incorporated Polish regions and Eupen-Malmedy.
3*Corrected figure for infant mortality, calculated while taking into consideration the natality development in the previous twelve months.

b. Social Structure. The occupational census of May 27, 1939, throws an interesting light on the social processes under the National-Socialist regime, for it covers the period from the establishment of the present regime to a time preceding the outbreak of the present war.

The preliminary results of the census are tabulated as follows:

Occupational

	1933	1939	Percentual Change
Agriculture and Forestry	13,715,000	12,265,000	-10.6
Distribution and Transportation	11,164,000	10,757,000	- 3.7
Industry	25,761,000	27,972,000	+ 8.6
Public and Private Services	5,114,000	6,860,000	+34.2

Social Status

	1933	1939	Percentual Change
Economically Independent	11,274,000	9,612,000	-14.7
Workers	—	—	+ 6.6
Civil Services	—	—	+10.2

Notable in these results are: (1) Decrease in those employed in agriculture and forestry; (2) Increase in those employed in industry; (3) Tremendous increase in "public and private" services group, embracing the new army and the new bureaucracy; (4) Large decrease in economically independent persons.

According to Wirtschaft und Statistik, a further analysis of the Population and Occupation census of 1939 reveals the following statistics.

Wage Earners

Industry and Crafts (41.5% of total)	16,500,000	Increase of 1,000,000 or (+ 7%)
Agriculture and Forestry	10,800,000	Decrease of 800,000 from 1925 (-10%)
Business and Trade	6,900,000	Increase of 760,000 from 1925 (+14%)
Government Service and Professions	4,100,000	Increase of 1,400,000 from 1925 (+70%)
Domestic Employment	1,500,000	
Total	39,800,000	

Vocational

Independent wage earners Contributors to family income	5,700,000) 6,700,000)	33 1/3% of all labor
Beamte (Officials) Clerks (Angestellte)	2,100,000) 5,300,000)	18.4% of all labor
Arbeiter (Workers) (Increase of 1,400,000 or 8.4% over 1925)	20,000,000	(more than 50%)

Officials and Clerks
Increase of 1,000,000 or 17%

Independent Wage Earners
Decrease of about 230,000 or 4.6%

At the end of 1940, the estimated total working population was 44,750,000, the civilian labor force being 37,250,000, of whom 22,670,000 were wage-earners.

The redistribution of available labor has been as follows:

	Percentual Change From mid. - 1939.
Metal and Engineering Industries	+20%
Chemical	+14%
Transport	+ 7%
Public Administration	+ 2¼%
Agriculture	+ 4 1/3%
Distributive Trades	-50%
Textiles and Clothing	-40%
Civilian Building	-66 2/3%

c. Social Conditions. Since 1939 there have been drastic changes in living conditions due to the war. The general description of the social and economic structure has necessarily brought about the suspension of many of those things which constituted a peace-time existence. Germany was not, however, entirely unprepared for this, since the rearmament program of the years previous to 1939 had already imposed heavy sacrifices on the public. However, from 1939 through 1941 there has been an intensification of every effort, with its concomitant effect on social existence.

Possibly having the greatest significance and the most direct effect on living conditions have been the enforced rationing and use of Ersatz foods and materials. The strict system of ration cards in force in 1940 has been continued in 1941. Due to the lack of fruits and vegetables, the diet has become increasingly monotonous. The meat allowance has been steadily decreased. The scarcity of some foods has led to the growth of the "black market" in Germany, as well as in the occupied countries. Some staple items such as coffee and tea are obtainable by these illegal methods, or not at all. Of other staple foods such as wheat, potatoes, and sugar there seems to be a satisfactory supply, although rationing continues.

The problem of proper nutrition has become a major problem. Especial care is given to mothers, children*, and certain categories of workers. Ration allowances for these groups have been more liberal.

There have been other necessary concomitants of modern war which have affected normal life. They are too numerous to list in detail since they extend into every corner of social and individual life. There have been, for example, such restrictions on gasoline and rubber that almost all private automobiles have been put away. There are laws which forbid, under penalty of death, listening to foreign broadcasts. But more important than these are the increases in working hours, further taxes, and requests for contributions.

The tremendous war effort has also affected other aspects of social life. In tapping every available source of man-power, it has been necessary to conscript thousands of women for the war industries. The length of service of the girls labor service has been extended, and students have been obliged to devote much of their time to the industrial effort.

The infiltration of millions of foreign workers and prisoners of war will undoubtedly have some effect on the social as well as the economic structure.

One of the outstanding features of National-Socialist policy during the past few years has been the granting of "marriage loans" of 1,000 marks to newly married couples as a means of stimulating family life and of increasing the birth-rate.

By October, 1940, some 1,600,000 marriage loans had been granted, and were being granted at the rate of about 20,000 per month.

The general amortization rate for marriage loans is 1% per month, or 3% if the wife is gainfully employed. Payments may be suspended altogether for the duration of the military service of the husband.

d. The Cost of Living. Official data on the cost of living reflect the stability of the wholesale price indices, although in regard to some categories of expenditure the upward trend is slightly more pronounced. The reservations made above regarding statistics on wholesale prices, as

*The Volkischer Beobachter of October 4, 1941 announced that, because of the increase in air attacks in September 1940, 1,500,000 children, and over 150,000 mothers with about 65,000 infants, had been sent into the country.

a result of the deterioration of quality and of the unavailability of certain goods, should be applied with still greater emphasis to the official cost of living data.

The following are the main changes which occurred during 1940 in the official cost of living indices (1913/14 = 100):

	Total cost of living	Food	Rent	Heating and light	Clothing	Miscellaneous
1939 (annual average)	126.2	122.8	121.2	124.7	133.3	142.0
1940 (annual average)	130.1	127.6	121.2	124.6	140.0	145.6
December 1940 (monthly average)	130.8	126.6	121.2	125.0	148.3	147.6
September 1941	133.3	128.3		122.7	160.8	

While expenses in connection with rents, heating and light remained practically stationary, the cost of food advanced from 122.8 in 1939 to 126.6 in December 1940. This rise was attributed principally to the higher prices of milk, butter, and cheese decreed in March 1940. Prices of bread, potatoes, sugar, eggs, margarine, meat and sausages have so far remained practically unchanged. It is open to doubt, however, whether the official indices take into account the consumers' outlay for the many food substitutes which have appeared in the market since the beginning of the war, the majority of which are not only expensive but also of questionable nutritive value.

Among the various items included in the cost of living, expenditures for clothing show the greatest increase during the war, the respective index having advanced from 133.3 in 1939 to 148.3 in December 1940. The reservation in regard to deterioration of quality applies to this group more than to any other.

Since December 1940, when the index was 130.8, the cost of living has steadily risen as is shown by the following table:

February 1941	- 131.9
March "	- 132.1
April "	- 132.4
May "	- 133.4
June "	- 134.1
July "	- 136.1
Week ending August 2, "	- 136.1
Week ending August 30, "	- 135.7
September "	- 133.3

Thus the 1941 average this far of about 134.0 compares with the 1940 average of 130.8 and the 1939 average of 126.2.

e. Labor. The organization of labor for the war industries presents some aspects which deserve close attention.

Although every man of military age is automatically mobilized, men in the war industries are classified as "not-replaceable" and "replaceable with difficulty"; the "not replaceable" workers are rarely required to report.

The flexible German system allows for a constant flux of men between the armed forces and the factories. A period of military service followed by a period of factory leave is regular and normal, and the contractual relation between the worker and the employer is not changed by the soldier's enlistment.

It is certain that thousands of skilled workers were returned to the factories when winter stopped the German drive against Russia, just as after the Polish campaign thousands returned to the factory.

It was reported that some 100,000 metal workers were released on factory leave in the autumn of 1940.

Germany's tremendous war effort has, of course, affected the distribution of labor. Every available source of man power is being tapped to meet the tremendous demands of the war industries. Women, as well as men, have been conscripted. The main efforts of the administration were directed towards an expansion in the supply of (a) foreign workers, (b) women workers, and (c) prisoners of war.

During 1940 the two principal measures resorted to in an effort to satisfy the demands of arms and munitions industries for skilled labor were conscription and "combing out" of workmen. The "combing out" for skilled workers was usually carried out by special commissions appointed by the Reich and local authorities. In 1940, ten commissions appointed by the Reich, investigated 1,000 firms from June to the middle of September and obtained the release of 26,000 workers, of which 6,000 were skilled. In each provincial labor supply region there are between five and ten commissions charged with the comb-out of firms employing 200 workers and more; the small firms are combed out of the local commissions attached to the local labor supply offices. Local commissions obtained the release of some 460,000 workers from December 1939 to October 1940 for transfer to the arms and munitions factories.

According to a despatch of January 29, 1942, Ministerial Director Werner Mansfeld has been added to the Ministry of Labor, and placed in charge of "fine-combing" German industry. He is expected to intensify women's contribution in the field of labor and to exploit further foreign sources of labor.

The "Work Book" (Arbeitsbuch) has proved of great value in mobilizing German labor reserves for the war industries, since the registration of types and times of employment of individual laborers provides a veritable inventory of industrial man power. The allocation of work and the recruitment of special types of workers at any given time have thus been systematized to an extremely high degree. Of the 36,000,000 eligible to receive such books, there still remained, in December 1941, about 5,500,000 to whom they were not yet issued. The Labor Offices

were said to be unable to issue more than 200,000 new books per month.

Some idea of the effect of the war on labor conditions in Continental Europe may be seen in recent announcements, according to the Belgium press, that in January 1942 there remained only 59,000 without work as compared with 400,000 unemployed in Belgium in the winter of 1940. The majority of the 59,000 are permanently unemployables. It was said that 10% of the Belgian population now lives on wages earned in Germany. In like manner, Switzerland had reduced the number of unemployed from 28,000 at the outbreak of hostilities, out of a population of 4,300,000, to only 4,380 unemployed registered at the end of July, 1941.

(1) Foreign Civilian Labor. Official statistics in October 1941, gave the total number of foreign civilian workers in Germany as 1,700,000. There is evidence that the actual figure is higher than this. Some estimates go as high as 2,500,000 which is not at all incredible. The following tables present the total by countries as of January 1942, based on both official figures and supplementary evidence which have revised earlier estimates.

Table I Estimates of Foreign Civilian Labor
Table II Occupational Distribution of Foreign Labor
Table III Distribution of Foreign Labor by Nationalities

The figures do not include prisoners of war, which include some 1,250,000 French and possibly 3,500,000 Russians.

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TABLE I

Country of Origin	German Ministry of Labor, April 1,1941	C.O.I., Dec. 1941	London Dec. 1, 1941	M.I.D., Dec. 30, 1941	Revisions Since January 1942
Poland	873,000	873,000	875,000	1,000,000	
Italy	132,000	325 - 400,000	400,000	400,000	
Belgium	87,000	210,000	200,000	210,000	
The Netherlands	90,000	156,000	120,000	156,000	
Protectorate Bohemia & Moravia	150,000 (Czechs)	150,000	150,000	150,000	
France	25,000	70,000	62,000	100,000	
Slovakia	69,000	69,000	85,000	69,000	
Croats		55,000	60,000*	60,000	70,000 Nov.2,1941 Frankfurter - Zeitung
Yugoslavia	48,000	48,000	48,000	48,000	
Denmark	31,000	35,000	40,000	35,000	60,000 Feb. 1?,1942 N.Y.Herald Tribune
Hungary	21,000	21,000	21,000	21,000	
Switzerland	17,000	17,000	17,000	17,000	
Russia**		10,000		10,000	
Bulgaria		8,000	16,000	8,000	
Rumania***		4,000	4,500	4,000	
Norway		1,400	1,000	1,400	

* In addition to those already in Germany. ** 300,000 Russians are said to be now working for Germany. (Stockholm January 29, 1942.) These are probably all in the Ukraine.
*** It is reported that Germany and Rumania have agreed to ship 16,400 Rumanian workers from 18 to 19 for work in mineral enterprises in Germany in 1942. (February, 1942)

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TABLE I (CONT.)

Country of Origin	German Ministry of Labor April 1, 1941	C.O.I., Dec. 1941.	London, Dec. 1, 1941	M.I.D., Dec. 30, 1941	Revisions since January 1942.
Sweden		1,200		1,200	
Spain		1,100	1,000	1,100 - 5,000	10,000 (100,000 more promised) M.A. London, 45,841, Dec. 15, 1941
Greece		500	3,000	500	
Finland		200	1,000	200	
Portugal		100		100	
TOTAL	1,543,000*	2,055,500 - 2,130,500	2,104,500	2,292,500 - 2,296,400	

* Official reports in January 1942 state that no less than 2,000,000 foreigners were earning wages in Germany in 1941. Of these 1,670,000 were men and 470,000 women.
A Stockholm report of January 29, 1942 states that between 2,100,000 and 2,200,000 are working for German industry under voluntary contract.

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TABLE II

OCCUPATIONAL DISTRIBUTION OF FOREIGN LABOR

8.10.41

	Number	In order of Importance.
Agriculture	928,700	Poles, Italians, Slovaks, Yugoslavs, Hungarians.
Metals	225,000	Italians, Czechs, Belgians, Dutch.
Building	212,000	Belgians, Czechs, Dutch, Italians.
Textiles	100,100	Belgians, Poles, Italians, Czechs, Dutch.
Mining	81,200	Italians, Belgians, Yugoslavs.
Dockworkers and Seamen	28,600	Belgians, Dutch, Danes, Poles.
Services - Restaurants, hotels, transport, etc.	60,000	Italians, French, Dutch, Danes. (Transport Czechs Dutch, Belgians.)
Miscellaneous Industries - Factories, food workers, hairdressers, etc.	270,900	Poles, Dutch, Belgians, French.
Miscellaneous - Road construction, loading, packing, cleaning, etc.	73,000	Poles, Czechs, Slovaks.
TOTAL	1,979,500	

Tables numbers II and III show the distribution of foreign civilian workers as far as can be determined from various sources.

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TABLE III

OCCUPATIONAL DISTRIBUTION OF FOREIGN LABOR

BY NATIONALITIES

8.10.41

Poles	Agriculture, road constuction, heavy work.
Italians	Miners, metal workers, chemical, textile, building.
Belgians	Building, metal, arms and munitions.
Dutch	Building, metal, textile, dock workers, food workers.
Czechs	Metal workers.
French	Building, metal, miscellaneous.
Slovaks	Miners, unskilled metal workers.
Croats	?
Yugoslavs	Miners.
Danes	Builders, dock workers, hotel and restaurant, metal.
Hungarians	Agriculture, metal.
Swiss	Arms and munitions.
Russian	?
Bulgars	Agriculture, building.
Rumanians	Agriculture.
Norwegians	Unskilled factory workers.
Swedes	?
Spaniards	Agriculture.
Greeks	? (None in Agriculture).
Finns	Seamen and industrial workers.
Portugese	?

It may be pointed out that Germany has always employed a large number of Polish workers for her agriculture during harvest time, and that this seasonal influx from Poland went as high as 500,000 persons.

It should also be noted that these figures do not include prisoners of war. It is known that large numbers of these are being used to repair roads and for other reconstruction. Probably 1,500,000 prisoners of war were employed by December, 1941.

Germany's policy of employing foreign workers has two important aspects. Primarily it helps to make up a deficiency in labor, due to the withdrawal of men for the armed forces. At the same time, by training the foreign workers in German methods, and subsequently releasing them for work in their home factories, Germany hopes to speed up production in the occupied countries: These workers are given an incentive by priority treatment upon their return, with a supplementary wage on account of their "superior training."

The German-Soviet War has necessitated obtaining additional contingents of male and female workers to the extent that, in 1941, girls who have served their term with the Girls' Labor Service have been ordered to work for another six months for "Auxiliary War Service," in the Army offices, hospitals, and institutions for social welfare. It is planned to increase the number of girls subject to Labor Service to 150,000, and, ultimately, to make labor service compulsory for all girls reaching a certain age.

Since the beginning of the war with England, there have been many efforts to mobilize women for industry. The extent to which this reserve has been tapped is not known. Figures from officials of the Ministry of Labor indicate that, in May 1941, some 8,300,000 women are employed. This figure may be compared with 8,100,000 employed in August 1939. Thus, there has been an increase of 200,000 women employed. The drive to recruit women laborers still goes on.

On January 26, 1942, it was reported that, according to the German labor institute, 10,000,000 women and girls were available as additional labor reserves.

An announcement in January, 1942 stated that 9,400,000 women were employed in Germany. Although this figure may be considered high, it is not incredible, and an even greater number can be expected. Wives and relatives of the foreign laborers constitute a great reservoir of female labor still untapped. Countless other women could be attracted by higher wages, bonuses and other rewards. Women were being interviewed by the Labor Office at the rate of 130,000 per month.

Students not subject to military service have been mobilized for the duration of their summer vacations. Girl students are reported to be working as long as 11 hours a day in munitions factories, and some have been seen employed as street-car conductors. Finally, the labor authorities are mobilizing domestic servants who are considered dispensable.

To increase the flow of youthful workers into the neglected industrial and white-collar jobs, German students in what corresponds to American high schools and preparatory schools will no longer have to pass

the customary "maturity examinations" on graduating.

This is announced in a decree that declares that with the coming Easter commencement period students may be graduated only on the basis of their classroom grades. The former universal maturity tests resembled a combination of "collective" examinations and intelligence tests.

The measure is one of a series now being introduced to hasten the progress of students into industry and business. The urgent need for them is emphasized in the large want-ad sections of the press. In line with this policy, technical schools are now frequently graduating engineering students in three instead of the usual four years.

To fill the ranks of male school teachers, which have been decimated by the wartime drain on civilian man power, former teachers who were banned from the schools in 1933 because of political non-conformity were being temporarily reinstated.

The war is said to have caused a shortage of applicants for the less romantic business professions and white-collar jobs. Vocational guidance lectures and circulars are being used in schools and Hitler Youth centers to make these fields attractive.

There has been no major increase in wage rates and in labor earnings, however. The rise in weekly earnings in December 1940 compared with the last peace year did not exceed 7.5%, an increase which might well be attributed to more overtime work in wartime. This stability of wartime wages is naturally due to the efforts of the government.

Russian prisoners are to be utilized for reconstruction work in the East. 200,000 prisoners are to undergo intensive training in the building trades at special camps.

An interesting development is a new regulation whereby workers whose homes have been damaged in air attacks, and have thus suffered loss of wages, may recover such loss to the extent of 90% from their employers, which in turn are reimbursed by the Bureau of Labor. If a longer period than the 14-day maximum immediately after the damage has been inflicted is necessary, the case goes to the President of the Labor Bureau for final decision.

The volume of output of industrial concerns has been closely guarded, but the reports of increases in pay rolls may serve as an index. Characteristic is the report of the Dynamit Nobel Company, controlled by the I. G. Farbenindustrie. The pay roll of this concern over a five-year period is as follows:

	Salaries and Wages Paid
1936	30,320,000 R. M.
1937	39,490,000 "
1938	47,990,000 "
1939	59,990,000 "
1940	92,450,000 "

Similarly, the Skoda works pay roll rose from 482,000,000 Czech crowns in 1939 to 1,110,000,000 in 1940, although part of this rise was due to the upward adjustment of wage rates in the Protectorate.

In recent years Germany has extended the policy of paid holidays for labor. About November, 1941, the Reich Miners Insurance Fund arranged for a two-weeks holiday for 50,000 miners at the expense of the fund. This reward may play a large role in maintaining efficiency as well as morale.

9. Summary and General Conclusions. In view of the fact that official statistics regarding imports and exports of essential raw materials, and of industrial production, have been withheld since the beginning of the present war, many of the estimates in this study are subject to revision. From the mass of conflicting evidence from official, semi-official, non-official, belligerent and non-belligerent sources, an attempt has been made to present as adequate a picture as possible, with emphasis on the period from August 1939 through December 1941.

The inauguration of the Second Four-Year Plan in October 1940, directed Germany's efforts more than ever toward the "gigantic work of reconstruction." The entire economic and social life of the country became subjected to a plan which had as its goal two aims: first, to create self-sufficiency with regard to essential raw materials, and, second, by the same elaborate and intensified industrial program, to pave the way for Germany's military supremacy.

Shortages. Possible shortages of metals are shown in the summary of the chapter on Mining and Metallurgy. Other shortages may be deduced from the expansion of synthetic and substitute products taken up in the chapter on Substitute Materials. The program of pre-empting and restrictions may also be indicative. The future will determine which predicted shortages are actual and critical. Nevertheless, for the purposes of documentation, and for the role they may play in our future economic warfare, the following list has been prepared, based on constant, and sometimes consistent reports.

1. Metals - already referred to.
2. Petroleum products - particularly lubricating oils and greases.
3. Vegetable oils and fats.
4. Coking coal.
5. Rubber.
6. Leather.
7. Cotton and wool.
8. Phosphate fertilizers.
9. Cement.
10. Quinine, codliver oil, iodine.
11. Vegetables and fruit.
12. Cocoa, coffee, tea, and tobacco.
13. Fodder.

14. Mica*.
15. Locomotives.
16. Jute.

Of even greater significance have been the reports of labor shortage, and of lack of transport facilities. It may be true that certain types of labor are scarce, particularly, for some war materials, for agriculture, and for transportation, but it would seem that there is sufficient labor to conduct the war effort for some time, although at the expense of consumer goods production. The necessity of supplying an extended eastern front, has, of course, led to a great strain on the transport system, and to the inability to meet all of the demands of occupied countries. There have been definite interruptions in shipments, but no factual evidence has been available to attribute the interruptions specifically to lack of raw materials, lack of transport facilities, weather conditions, or to general economic reasons.

*Mica. The European production of Mica for 1938, the last year for which official statistics are available, is as follows:

	Metric tons
Italy	122
Norway (exports)	104
Rumania	22
Sweden	131
Total	379 Metric tons

It may be noted that Germany had a production of 158 metric tons in 1932, which dropped to 73 metric tons in 1934. There has been no production since that time, and no intimation as to whether any considerable production can be expected now.

It is known that Germany is endeavoring to conclude a contract for Spanish Mica. It has also been reported that Mica is being replaced by paper for insulating purposes in the construction of condensers and by a ceramic insulating material for high performance plugs.

Details concerning reports of deposits of Mica in Austria and Switzerland are lacking.

It may be that Mica, heretofore indispensable for armatures, airplane spark plugs, radio tubes, transformers, and radio condensers, constitutes one of Germany's immediate problems.

In order to obtain the first objective, i.e., self-sufficiency, Germany acquired stock-piles of essential raw materials. In any current economic estimate of Germany's potential, this remains the greatest unknown factor. Predicted shortages of copper, tungsten, petroleum and others are based on incomplete knowledge of the situation. The only apodictic statement that can be made is that, to date, there has been no substantial proof of a critical breakdown in Germany's industrial effort. That shortages exist, however, is obvious from the strict rationing, and from the almost feverish search for substitute materials. The rationing alone does not postulate an immediate serious position, since the program, no doubt, envisages a long-term operation.

The closing of the Trans-Siberian railroad to Germany at the beginning of the Russian campaign was unquestionably a serious, even if an expected, blow to Germany. Nevertheless, the imports from the Far East during the previous years remain practically a closed book to us. Shipments involving blockade-running during the last two years likewise cannot be estimated.

For those raw materials which Germany could not produce or obtain, or in the future might not be able to procure, she began an extensive program of synthetic and substitute production. The search for substitutes began as early as the World War, when, due to the blockade, Germany was forced to find substitutes for copper, for example. In another chapter of this survey, some idea of the extent of the entire synthetic and substitute program may be found.

Most notable in the vast program of industrial rationalization has been the methodical, extensive plan of standardization. This is one part of the proposed "New Order" which has been, and will be, of the greatest economic and social significance. The curious anomaly is thus evident in Germany of building the foundation and the super-structure at the same time. The indoctrination of National-Socialistic ideology from above meets the moving forces of industrial reorganization from below.

Standardization, which may be taken as the leitmotif of the present regime, has affected almost every German industry. Trade names have disappeared by scores, and overnight. The number of types of automobiles, of parts and tires was drastically and officially reduced. Tank assembly and engine works were standardized.

Medium and low tension distribution systems were rationalized as regards transmission voltage, and this standardization is of some note on account of the ensuing simplification of specifications in the manufacture of all kinds of electrical appliances.

Electrical machinery and appliances, radios, equipment of all kinds were likewise affected. Even the number of soaps and shaving creams was reduced to but a few. And in like manner the exact composition of chemicals, for example, soaps, and other products was determined by the appropriate industrial boards.

The standardization of war equipment, industrial machinery, and consumer goods had very definite advantages. It served, first of all, to eliminate waste of raw materials, and, just as important, it simplified the problem of production, of production machinery, and of servicing. The

entire question of training personnel and of apprentice instruction was likewise made simpler.

One of the necessary concomitants of the wartime economy has been the shrinking supplies of consumer goods, with the subsequent accumulation of idle purchasing power. To offset this spread, the government offered new inducements for transferring savings to government uses. Workers who renounce the right to demand repayment of savings deposit until twelve months after the end of the war are to be rewarded by exemption of blocked deposits from income and property taxes. A parallel feature is the opportunity given to business concerns to create investment balances entrusted for the duration of the war to the Treasury, representing amounts that would ordinarily be spent for replacement of equipment or amortization. These funds, likewise, will be tax-exempt. This blocking of funds is a feature of general financial stabilization. It may be concluded that the financial structure of Germany today is apparently sound.

Along with the program of standardization, there has been noted an increased tendency to decentralize important industries. This decentralization has been based on military, economic, and social reasons. To decrease the vulnerability of congested areas, industries have been scattered and shifted from zones which can be readily reached by air. This shifting has, however, not been at all haphazard. Although the military reason has been the prime consideration, an economic factor of great importance has likewise played a leading role - namely to shift the industry to more favorable areas, to take advantage of proximity to raw materials, or water power, for example. Great care has been taken to avoid shifting to industrial areas which are already overburdened. The social consideration is reflected in the choice of certain areas for health reasons.

For these reasons, it is reported, the entire chemical industry has been decentralized. Likewise it has been the tendency to build a larger number of smaller power stations, up to a maximum size of about 200,000 k.w. each, primarily for strategic reasons. It may be deduced that this program will play a large part in the planned "New Order."

The last three years have been marked by a rapid integration of the various European economics, consisting of systematic exploitation of booty and conquered areas, as is evidenced by the establishment of a new economic organization for this purpose, and by the appointment of Dr. Alfred Rosenberg as Reich Minister for the Occupied Russian Territory.

Rosenberg announced February 13, 1942, the establishment of a "land control" company to direct agricultural operations in territories taken from Russia. Rosenberg administers this area as "Reich Commissar for Ostland."

The company will direct production on all estates in the zone and will control fruit plantations, truck gardens, fisheries and enterprises raising fur-bearing animals. In addition, it will train inhabitants in latest methods for increasing production.

Regional offices will be established at Riga, Tallin, Kaunas, Minsk and Pskov.

In September, 1941, General Director Voss of the Hermann Göering Werke was appointed as President of a new Deutsch-Slowakische Gesellschaft (German-Slovakian Company) to improve the cultural, political and economic relations between the two states.

The exact extent of German infiltration into the economic and political life of the occupied countries, and likewise, of the ostensibly "free" European countries cannot yet be properly evaluated.

Germany's economic penetration into the occupied countries has proceeded methodically. The leaders of German industry and finance have concentrated their attention on securing an advantageous position by various means. Thus, in France, an agreement was reached whereby the I. G. Farbenindustrie, the German Chemical Corporation, acquired 51% of the stock in the new French dyestuff and chemical company, Francolor.

The principal German and French electrical concerns have likewise collaborated. It is known that the Germans are sharing with their French collaborators their experience in the use of all kinds of Ersatz for non-ferrous metals, rubber, and other materials. This will result, it is said, in a substantial increase in the production of the French electrical industry.

As part of the proposed economic "New Order," the German Cartel system could be expected to play a prominent part. Since the advent of the Hitler regime, the Cartel has become primarily an agency for carrying out the economic policies essential to the accomplishment of national political objectives. Outstanding industries in European countries can be expected to form Continental European cartels, under German leadership. This development has taken place in industries as iron and steel, cement, wood pulp, glassware, and even zippers, and could readily be extended to others.

Appendixes

Appendix A - The Russian position in German trade.

Appendix B - Location maps*.

Map I : Producers of A.F.V.'s (armored Fighting Vehicles) and Engines (i.e., Tanks, Armoured Cars).

Map II: Producers of Steel and Armaments.

Map III: Producers of Gears, Brakes and Clutches - Ball bearings and Friction Linings.

Map IV: Producers of Miscellaneous Accessories.

Appendix C - Growth of the Reich from 1933 to May 1940.

Appendix D - Analysis of Resettlement in Northeast

Appendix E - Economic Who's Who.

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*The numbers accompanying the symbols refer to another text. They do not pertain to this Economic Estimate. The maps are presented here for general orientation.

APPENDIX A

RUSSIAN POSITION IN THE GERMAN TRADE

According to official statistics, it appears that the Russian position in the German foreign trade has declined steadily during the 8 years' period 1931 to 1938 inclusive. During the first 7 months of 1939 this downward tendency continued. The following table illustrates the trend.

SHARE OF SOVIET RUSSIA IN GERMANY'S FOREIGN TRADE

Period	Russia's share of total exports from Germany	Russia's share of total imports from Germany
1931	8 %	4.6%
1932	10.9%	5.8%
1933	5.8%	4.7%
1934	1.5%	4.7%
1935	0.9%	5.2%
1936	2.7%	2.2%
1937	2.0%	1.2%
1938*	0.6%	0.9%
1939 (7 months)**	0.4%	0.6%

A table has also been prepared to show the Russian situation in the German trade during the first 7 months 1939, expressed in Reichsmarks, as compared with the ten most important suppliers in the 1937 - 1939 period. While for comparative purposes the table is not altogether accurate, due to the change in the method of statistical calculation, the order of the important countries as compared with Russia can be seen.

*Excludes German trade with Austria. Inclusion of Austria would probably have no discernible effect on results.
**Figures are on new basis which, however, would not change the results greatly.

APPENDIX A - Continued

Principal Sources of German Imports in 1939 (7 months)
Importance

in million of RM

(the relative rank of each country for given year is shown in parenthesis)

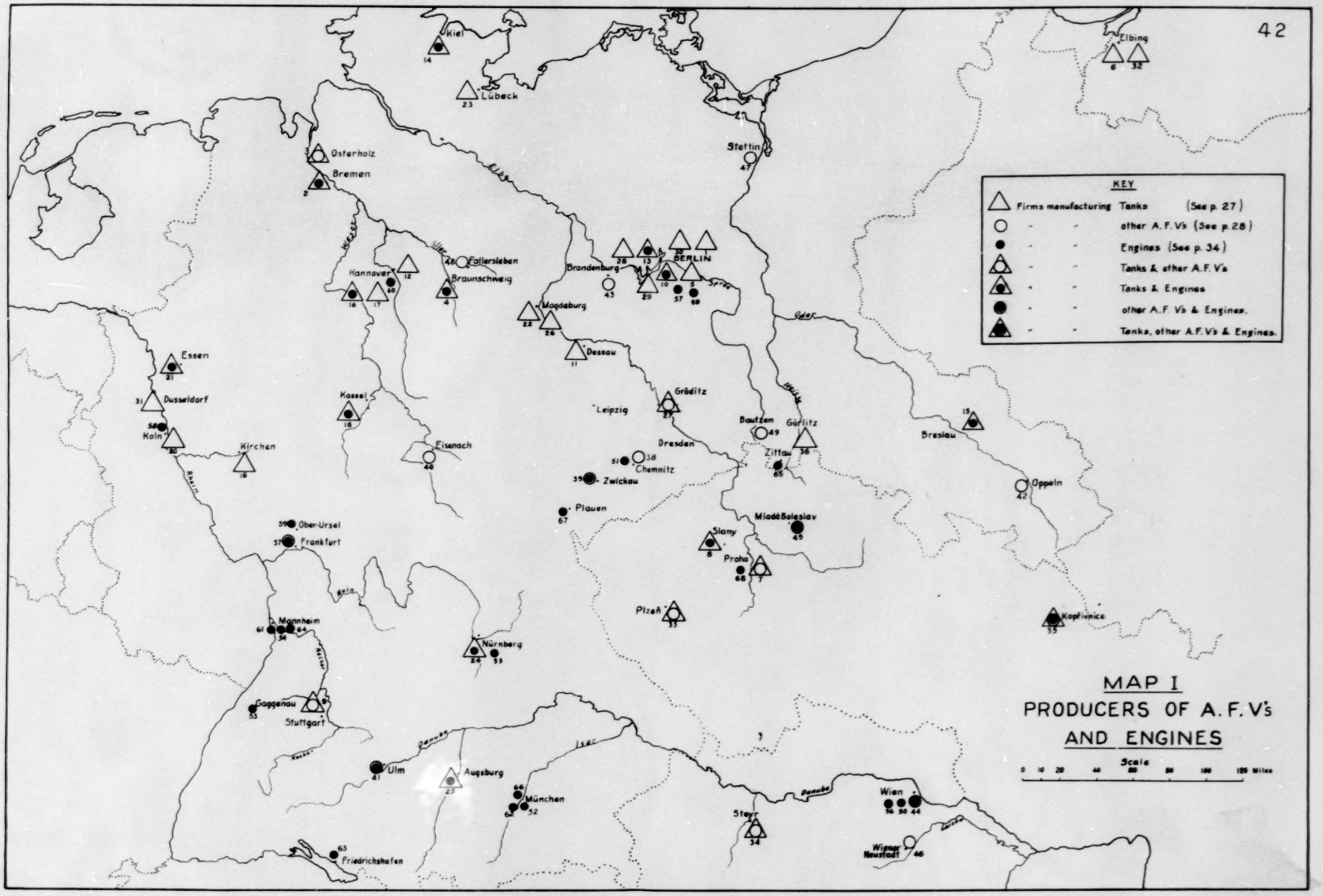
Country	1939 (7 months)		1938		1937	
	RM	Order	RM	Order	RM	Order
Italy	185.9	(1)	245.6	(4)	221.0	(5)
Great Britain	153.2	(2)	282.8	(2)	308.6	(1)
United States	145.0	(3)	404.6	(1)	281.9	(3)
Sweden	144.7	(4)	261.7	(3)	231.9	(4)
Hungary	127.3	(5)	***		***	
Rumania	108.8	(6)	***		***	
Brazil	108.1	(7)	214.4	(6)	186.2	(8)
Holland	107.9	(8)	197.9	(7)	215.8	(6)
Denmark	107.6	(9)	166.3	(9)	157.7	***
Argentine	92.3	(10)	216.1	(5)	295.2	(2)
Russia	13.9	(47)	47.4	(34)	65.2	(31)

Principal Destination of German Exports in the Order of their 1939 (7 months) importance

In million of Reichsmarks

Country	1939 (7 months)		1938		1937	
	RM	Order	RM	Order	RM	Order
Holland	257.9	(1)	447.8	(1)	468.0	(1)
Great Britain	192.3	(2)	350.9	(2)	432.2	(2)
Italy	189.2	(3)	301.0	(3)	311.3	(3)
Sweden	188.1	(4)	267.3	(4)	277.3	(6)
Switzerland	145.1	(5)	207.2	(7)	231.0	(7)
Denmark	123.0	(6)	201.9	(8)	217.8	(8)
Rumania	116.7	(7)	***		***	
Hungary	114.3	(8)	***		***	
France	111.6	(9)	216.7	(6)	313.4	(4)
Turkey	110.1	(10)	151.4	(10)	***	
Russia	20.2	(36)	31.8	(28)	117.4	(19)

*** Not in first ten



KEY

- Firms manufacturing Tanks (See p. 27)
- " " other A.F.V's (See p. 28)
- " " Engines (See p. 34)
- " " Tanks & other A.F.V's
- " " Tanks & Engines
- " " other A.F.V's & Engines.
- " " Tanks, other A.F.V's & Engines.

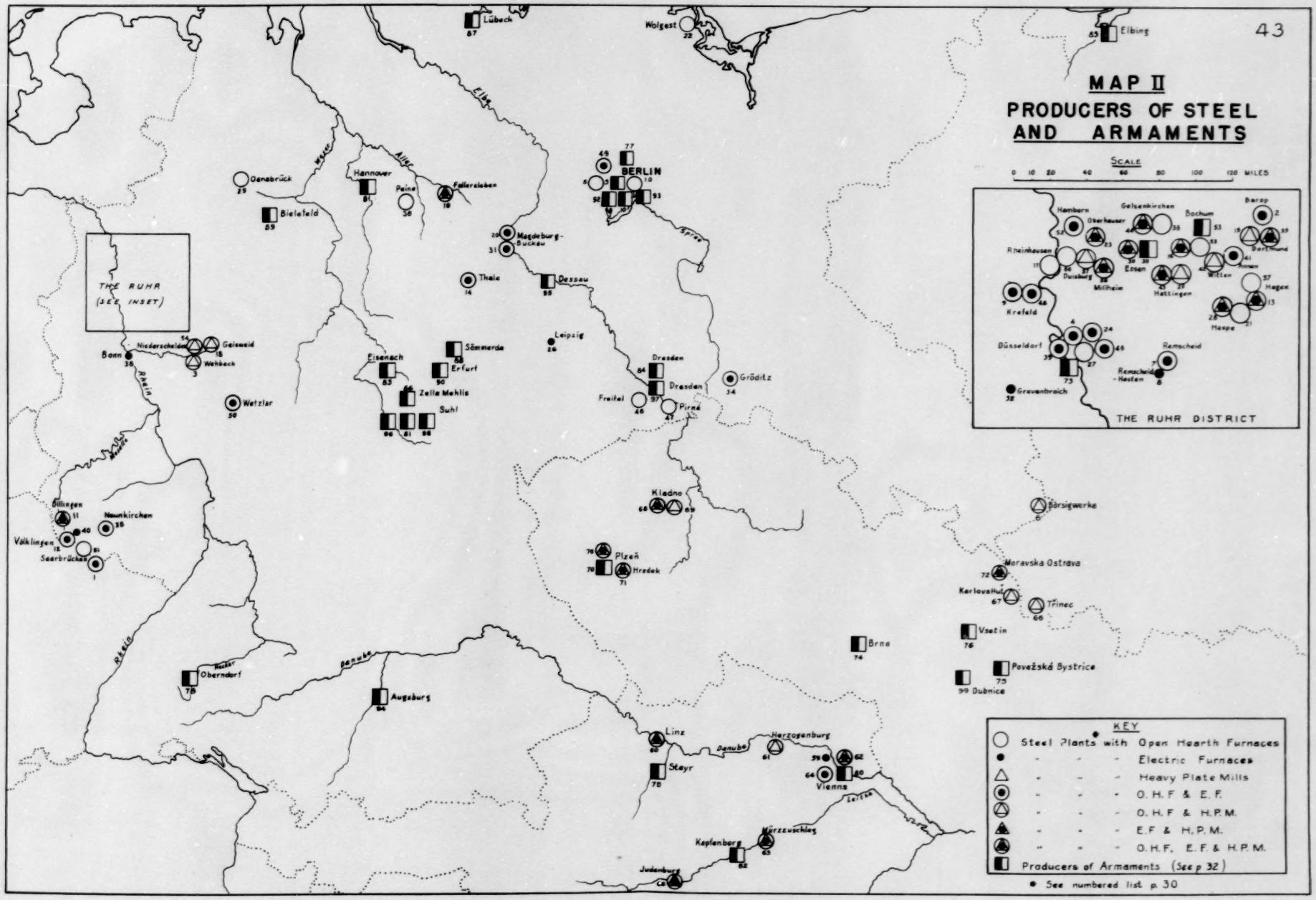
MAP I

PRODUCERS OF A.F.V's AND ENGINES

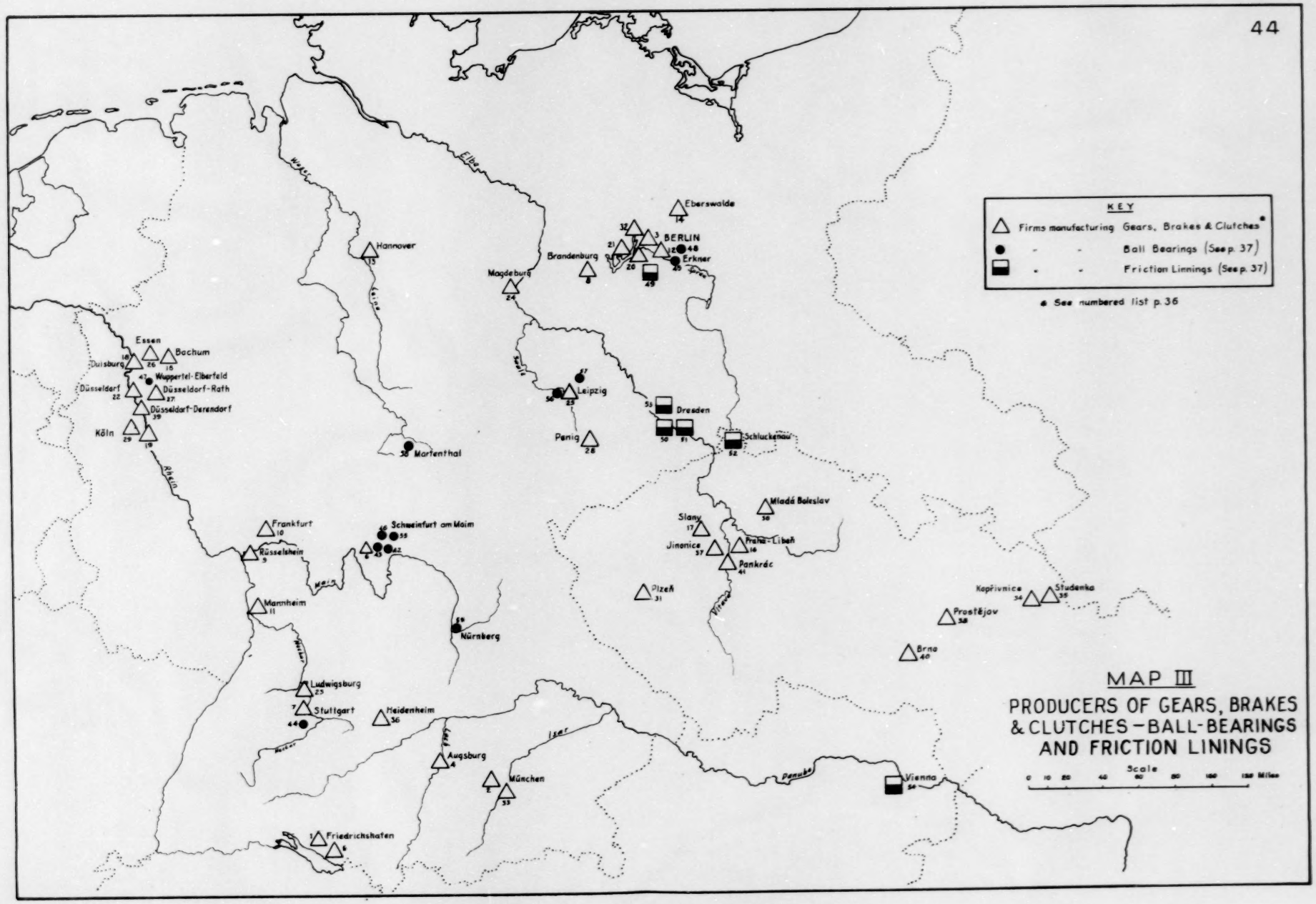
Scale

0 10 20 40 60 80 100 120 Miles

MAP II
PRODUCERS OF STEEL AND ARMAMENTS

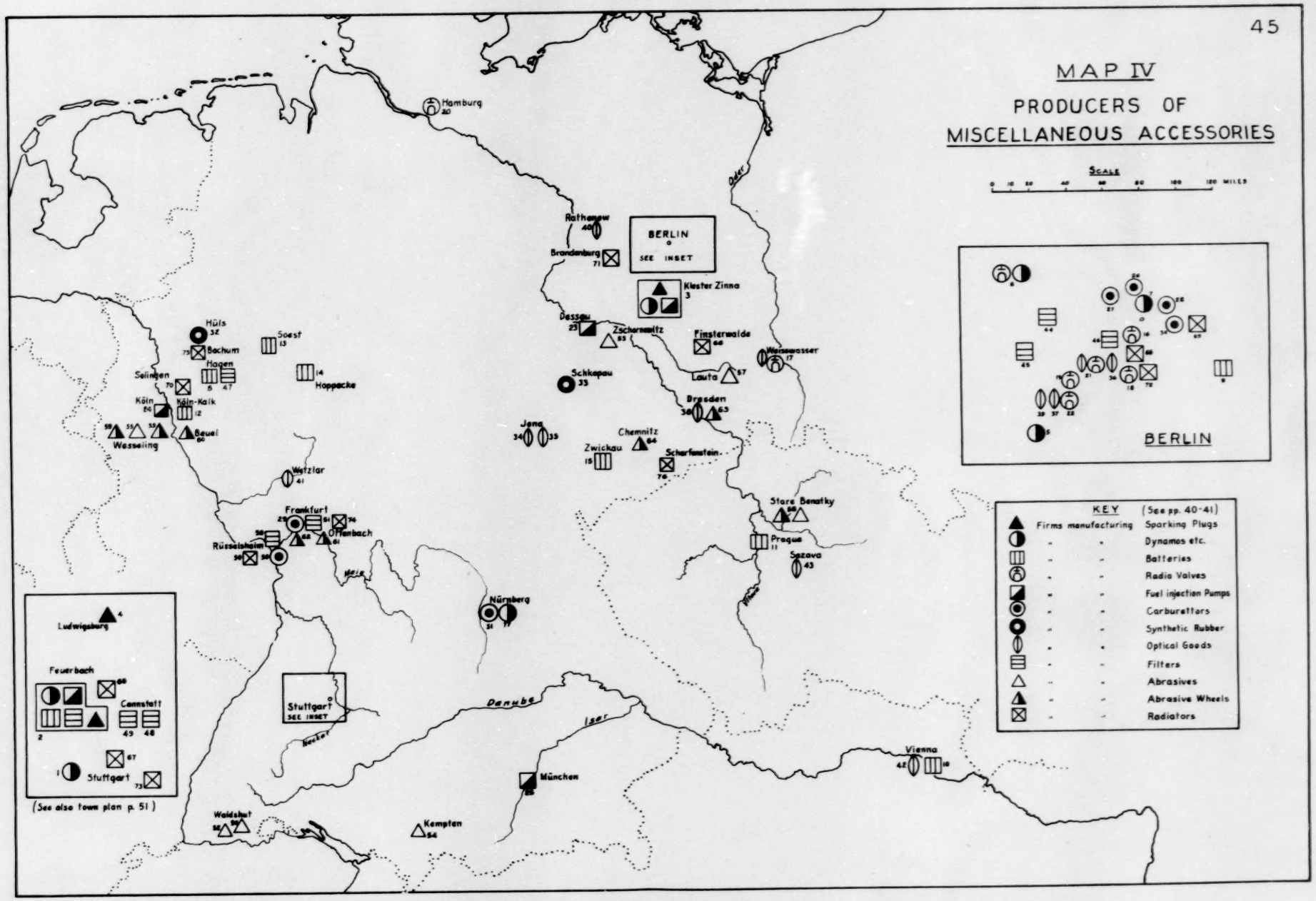


• See numbered list p. 30


KEY
Firms manufacturing Gears, Brakes & Clutches*
Ball Bearings (See p. 37)
Friction Linnings (See p. 37)
* See numbered list p. 36
Elbe
Weser
Rhein
Main
Neckar
Donau
Isar
Lech
Hannover
Magdeburg
Brandenburg
Eberswalde
BERLIN
Erkner
Leipzig
Dresden
Panig
Schluckenau
Mladá Boleslav
Slaný
Jinonice
Praha - Libeň
Pankrác
Plzeň
Kopřivnice
Studenka
Prostějov
Brno
Vienna
Essen
Bochum
Duisburg
Wuppertal-Elberfeld
Düsseldorf
Düsseldorf-Rath
Düsseldorf-Derendorf
Köln
Martenthal
Frankfurt
Rüsselsheim
Schweinfurt am Main
Mannheim
Nürnberg
Ludwigsburg
Stuttgart
Heidenheim
Augsburg
München
Friedrichshafen
MAP III
PRODUCERS OF GEARS, BRAKES & CLUTCHES – BALL-BEARINGS AND FRICTION LININGS
Scale
0 10 20 40 60 80 100 120 Miles

MAP IV

PRODUCERS OF MISCELLANEOUS ACCESSORIES



APPENDIX C

The following table published by the Reich Statistical Bureau indicates the growth of the Reich in terms of population and territory through successive incorporations and annexations from the beginning of 1933 to May 1940.

Table:

	German Reich (including Protectorate Bohemia and Moravia)	
	Territory in sq. km.	Population
Territory of Reich at the beginning of 1933	468,620	68,474,132
Saar (March 1933).....	1,925	842,454
March 1935 to March 1938.....	470,545	69,316,586
Austria (March 1938).....	83,764	6,650,306
March 1938 to October 1938.....	554,309	75,966,892
Sudetenland (October 1938).....	29,099	3,408,389
October 1938 to March 1939.....	583,408	79,375,281
Protectorate Bohemia and Moravia, (March 1939).....	48,959	7,000,000
Memelland (March 1939).....	2,848	154,694
March 1939 to September 1939.....	635,215	86,530,000
Free State of Danzig (September 1939)	1,951	407,517
September 1939 to October 1939.....	637,166	86,937,000
Former Polish Provinces (October 1939)	91,974	9,627,000
November 1939 to May 1940.....	729,140	96,565,000
Belgian Communes Eupen, Malmedy and Moresnet (May 1940).....	1,056	68,590
May 1940.....	730,196	96,634,000

APPENDIX D

Analysis of Resettlement in Northeast

According to the last analysis of the Reich's Statistical Bureau, up to the present time there have been settled in the northeast:

Germans from:	Men	Women	Totals
Esthonia	5,389	7,479	12,868
Latvia	21,641	27,000	48,641
Volhynia	31,801	32,753	64,554
Galicia	27,831	27,609	55,440
Narew territory	3,825	4,228	8,053
General Govt.	14,452	15,832	30,275
	104,939	114,892	219,831

The age divisions and social grouping of the settlers present in their entirety a very favorable picture, since each group compliments the other:

The Age Division of the Settlers in Percentages

	Esthonia	Latvia	Volhynia	Galicia	Narew	Ost. Genl. Govt.	Old Reich 17.5.39
under 14	15.2	18.4	37.7	28.9	25.9	38.3	21.7
14 - 65	70.7	71.3	58.8	67.3	68.2	57.4	70.5
Over 65	14.1	10.3	3.5	3.8	5.9	4.3	7.8

The Occupational Division of the Settlers According to Their Economic Grouping in Percentages.

	Esthonia	Volhynia	Galicia	Narew	Ostl. Genl. Govt.	Old Reich 1933
Farmers and Foresters	20.1	85.9	65.6	25.8	83.1	28.8
Industry and Crafts	30.5	8.5	19.9	39.8	8.8	40.5
Business and Commerce	31.0	2.9	10.2	20.2	4.1	18.4
Public Services	16.1	0.9	4.1	9.5	2.4	8.4
Domestic Services	2.3	1.8	0.2	4.7	1.6	3.9

APPENDIX E

List of Cabinet Officers.

Führer and Chancellor).....Adolf Hitler
Minister of Defence)
Minister of Interior.....Dr. Wilhelm Frick
Foreign Minister.....Joachim von Ribbentrop
Finance Minister.....Count Schwerin von Krosigk
Minister for food and agriculture.....Walther Darré
Minister for Labor.....Franz Seldte
" " Post.....Wilhelm Obnesorge
" " Transport.....Dr. Julius Dorpmüller
" " Air.....Reich Marshal Hermann Göring
" " Science and Education.....Bernhard Rust
" " Church Affairs.....Hanns Kerrl
" " National Enlightenment and Propaganda.....Josef Goebbels
" " Armaments and Munitions.....Dr. Fritz Todt
Inspector General for Water amd Power .....Dr. Fritz Todt
Reich Minister for the East.....Dr. Alfred Rosenberg

CLASSIFICATION
Changed to
UNCLASSIFIED

Economic Who's Who.

The following list is partial and tentative. It may be helpful as a reference to those men who are shaping Germany's economic policies.

1) ALPERS, Frederich
Director of Division for Forestry.
Executive and Chief Forester in the Office of Reich Forestries.

2) AMANN, Max.
Reich Press Director.

3) BACKE.
Director of the Nutrition Division (in the Ministry for Food and Agriculture under Darré).

4) BENTZ, Professor Dr. A.
Deputy for the Promotion of Oil Production.

5) BOHRMANN, Martin
Deputy Führer. Appointed February 19 (or February 15?). 1942 to succeed Rudolf Hess.

6) BÜHLER, Dr. Theodor.
Technical General Consultant of the Institute for the Study of Labor of the German Labor Front.
Author of: A Survey of the Social Tasks of Political Economy.

7) BÜHRMANN, Generalmajor.

Commissioner for the Exploitation of Polish Raw Materials.

8) CLODIUS, Dr. Karl.
Negotiator of German Economic Accords.

9) CONTI, Dr. Staatssekretär.
Reichgesundheitsfuhrer.
Reich Health Leader.

10) DARRÉ, Walther.
Minister for Food and Agriculture.

11) DIETRICH, Otto.
Director of Government Press Relations.

12) DORFMÜLLER, Dr. Julius.
Minister of Transport.

13) EICKE, Dr.
Government Expert on German Foreign Trade.

14) FELLGIEBEL, Generalmajor.
Special Technical Deputy for Communications.

15) FISCHBÖCK, Hans.
Reich Commissioner for Prices with the rank of Secretary of State, succeeding Joseph Wagner who held the position since 1936.
Formerly Economic and Financial Commissioner General for the Occupied Netherlands.

16) FRANK, Dr. Hans.
Governor General for the Occupied Polish Territories.

17) FRICK, Dr. Wilhelm.
Minister of Interior.

18) FUNK, Dr. Walther.
Reich Minister for Economic Affairs (January 15, 1938).
President of the Reichsbank (January 20, 1939).

19) GOEBBELS, Josef.
Minister of National Enlightenment and Propaganda.

20) GÖRING, Hermann.
Minister for Air.
High Commissioner for the Four-Year Plan.
Head of Hermann Göring Werke.

21) HANNECKEN, von.
Chief Deputy for German Power Production.

22) HIERL, Konstantin.
Reich work Director in the Ministry of the Interior.

23) HITLER, Adolf.
Führer and Chancellor.
Minister of Defence.

24) KERRL, Hanns.
Minister of Church Affairs.

25) KLEINMANN.
Traffic and Communications Division.
Executive in the Reich Traffic Ministry under Dorpmüller.

26) KOCH, Erich.
Reich Commissioner for the Ukraine under Rosenberg.

27) KRAUCH, Prof. Dr. E.
Chief Deputy for Special Affairs Affecting Chemical Production.

28) KROSIGK, Count Schwerin von.
Finance Minister.

29) KRUSE, Hans.
Chief of Welfare Work.

30) LEY, Dr. Robert.
Reich Director of the German Labor Front.

31) LOHSE, Heinrich.
Reich Commissioner for the Ostland (Baltic States and White Russia (Ruthenia), under Rosenberg.

32) MANSFELD, Werner.
Added to Ministry of Labor in January 1942 and placed in charge of "fine-combing" German Industry. Succeeded Freidrich Syrup as Secretary of State for Labor.

33) MEYER, Dr. Alfred
Dr. Rosenberg's Deputy and Assistant Minister.

34) MOBIUS, Dr.
President of the Labor Department for Saxony.

35) NEUMANN.
Director of Division for Currency.

36) OHNESORGE, Wilhelm.
Minister of Post.

37) POENSGEN, Ernst.
President of the Vereinigte Stahlwerke.
(United Steel Works).

38) PLEIGER, Paul
General Manager of the Hermann Göring Works.
President of the Reich Coal Association.

39) PUHL, Emil
Vice-President of the Reichsbank.

40) REINHARDT, Fritz.
Coordinator for Employment, Finance, and Taxation.

41) RIBBENTROP, Dr. Wilhelm.
Foreign Minister.

42) RIEDER, Dr.
In the Wirtschaftsministerium. (Ministry of Economics).

43) ROSENBERG, Dr. Alfred.
Reich Minister for the East (Chief Civilian Administrator of occupied Soviet Territory). (November 17, 1941).

44) RUST, Bernhard.
Minister of Science and Education.

45) SCHELL, von Major General.
Chief Deputy for Automotive Transport.

46) SELDTE, Franz
Minister of Labor.

47) SEYSS - INQUART, Dr.
Reich Commissioner for the Netherlands.

48) SPEER, Professor Albert
Inspector General of Construction. Appointed successor to Dr. Todt in February 1942, as Inspector General of German Highways.

49) SYRUP, Dr.
Director of the Division for Allocation of Labor.

50) THOMAS, Major General.
Head of the special economic division to reinforce the engineering group under Dr. Todt.

51) TODT, Dr. Fritz.
Inspector General of German Highways.
Inspector General for Special Tasks connected with the Four-Year Plan. (February 23, 1940).
Reich Minister for Armaments and Munitions (March 17, 1940).
Inspector General for Water and Electric Power (July 29, 1941).
Head of Organization Todt.
Died February 8, 1942.

52) TONNINGEN, Rost van.
Director of the Bank of Netherlands.

53) TROJE, Dr. Erich.
Factory Manager.

54) UIBER, Prof
New President of the Berlin Medizinische Gesellschaft. (Berlin Medical Association).

55) VOSS,
General Director of Hermann Goring Werke.
Appointed President of a new Deutsch Slovakische Gesellschaft in Sept. 1941.

56) WAGNER, Adolf.
Reich Commissioner of Price Control.

57) WALTER, Paul.
Deputy for Production Increase in Mining.
Liaison Agent with the General Council for the Four Years Plan.

58) WEHRLIN, Jakob.
General Inspector of Automotive Transport.
(Appointed January 16, 1942).

59) WINKLER, Bürgermeister a D. Dr.
Attorney General for the East.

60) ZANGEN, Wilhelm.
Director for Rationalization of Industry.
Appointed 1942.